

PHYSIOTHERAPEUTIC TECHNIC


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# Index of Physiotherapeutic Technic

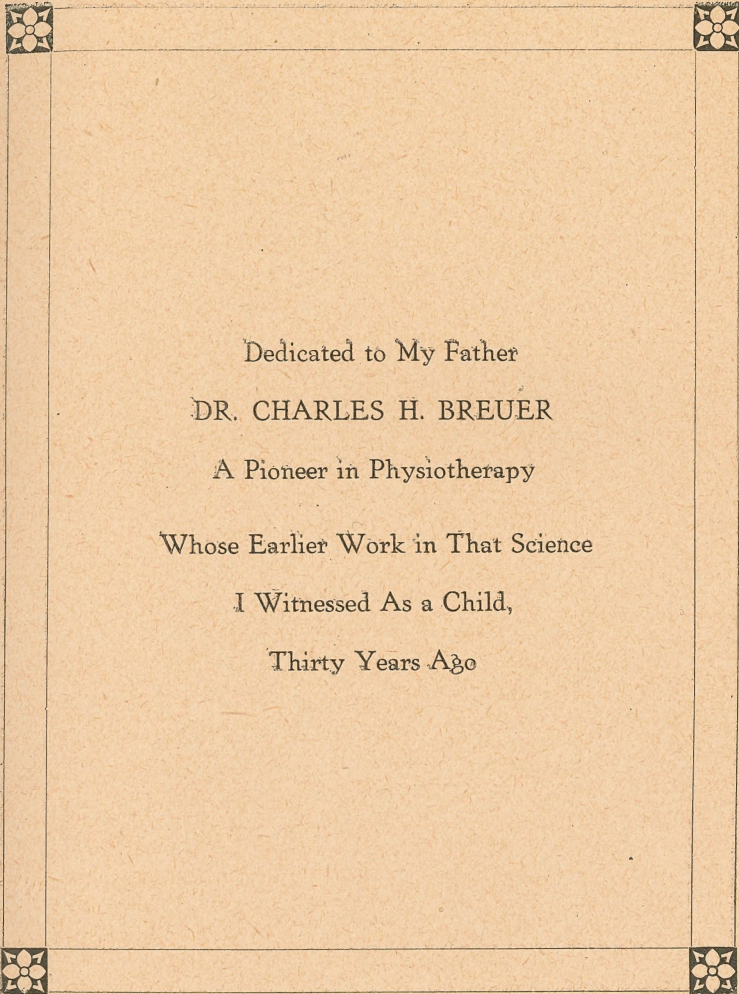
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Dedicated to My Father  
DR. CHARLES H. BREUER  
A Pioneer in Physiotherapy  
Whose Earlier Work in That Science  
I Witnessed As a Child,  
Thirty Years Ago



## PREFACE

The widespread interest of the medical profession in the use of physical agents in treating the sick prompted this book. It seemed to the author that an index of technique proven valuable in the treatment of the various diseases amenable to physical therapy might help to standardize technique and give a better method of comparing results. That there is a definite field for physical therapy no one will deny. It is hoped that this "Index" may help us to more clearly see the boundaries of the field and to more correctly apply the agents to that field. In numerous places in the text reference is made to the use of the "vacuum electrode." The "nonvacuum electrode" can be used equally well.

Grateful acknowledgment is made to the Victor X Ray Corporation, Engeln Electric Company, Paul E. Johnson, Burdick Cabinet Company and H. G. Fischer Company for the use of cuts illustrating the method of application of various physiotherapy measures.

M. J. B.

Lincoln, March, 1925.



## ABSCESS

### Prophylactic or Abortive treatment:

**High Frequency:** Low-vacuum tube, capable of producing  $\frac{1}{4}$  to  $\frac{3}{4}$  inch spark, but held in contact with the skin. Use enough current to get the benefit of the heat generated, 10 to 15 minutes daily.

**Radiant Heat:** Expose for several hours, keeping the surface softened with vaseline or glycerine.

**Ultraviolet Light:** Two minutes contact with the water-cooled lamp, repeated in a day or two if necessary.  
Five to eight minutes on a small area around the abscess, with the air-cooled lamp at 10 inches, repeated in a day or two if necessary.

### After Incision and Drainage:

**High Frequency:** Same as above.

**Radiant Heat:** One to three hours daily.

**Ultraviolet Light:** Same as above.

**Ionization with Chlorine, Mercury, or Zinc:** Use a nozzle electrode, a glass tube to introduce the solution into the abscess cavity, with a wire inside it as the electrode. (See *Ionization* for details of technic). Do not use zinc near large blood vessels; its solvent action is apt to produce hemorrhage.

**Vibration:** Over adjacent lymph nodes: high speed, lateral stroke. Stimulating technic (See *Vibration, general technic*) on corresponding spinal areas.

*Do not use diathermy over enclosed pus.*

## ACIDOSIS

**Radiant heat** over the entire body.

**Autocondensation:** Low current density, (500 ma.) and long time, 30 minutes.

Elimination is the principal result accomplished by the above. Large quantities of water should be administered to the patient preceding the treatment.

## ACNE ROSACEA

**High Frequency:** Destroy the large, visible veins with fulguration from the unipolar, or Oudin terminal. The indirect method is less painful; the patient seated on the autocondensation pad, while the operator manipulates the electrode with his bare hand, and draws off the current through himself to the ground. (See *Indirect Diathermy*.) The length of treatment and number of veins

destroyed should depend on the patient's tolerance, not over 8 to 10 minutes.

**Carbon-Dioxide Snow:** One minute of moderate pressure.

**Electrolysis:** Use a needle on the positive pole to obliterate the enlarged vessels, with 3 to 5 ma., applied long enough to blanch the tissues.

**Ultraviolet Light:** Preliminary treatment for 20 minutes with radiant lamp.

Air-cooled lamp, 20 to 10 inches, 1 to 8 minutes.

Water-cooled lamp,  $\frac{1}{2}$  to 3 min., 1 inch.

Blister heavily. Apply locally only.

Do not repeat any of the above treatments until the reaction from the previous one has subsided. This should be in 6 to 10 days.

X-rays: q. v.

## ACNE VULGARIS

**High Frequency:** Glass vacuum electrode, kept in contact with the skin, or used through a layer or two of gauze to give a short spark. Keep it moving around. Graduate the current intensity so that it will give about a  $\frac{1}{4}$  inch spark. Treat from 7 to 12 minutes, three to six times a week.

**Ultraviolet Light:** Preliminary exposure to radiant lamp, for about 20 minutes.

Air-cooled lamp, 2 to 10 minutes, 30 to 10 inches.

Water-cooled lamp,  $\frac{1}{4}$  to 2 minutes, 2 to 1 inches.

Three times a week, locally

Accompany by general exposure to air-cooled, if the system requires it.

Sampson recommends that the above two methods of treatment be preceded by an "ionizing" dose of x-ray; that is, a dose so small as not to have any of the usual irritant or destructive effects of x-ray.

**Ionization (q. v.)** of sodium salicylate at the negative pole. Positive electrode in the patient's hand. Soak a piece of gauze with the salicylate solution; lay over it a block tin or wire-gauze electrode; give 30 to 40 ma. for 30 to 45 minutes.

**Vibration:** Soft rubber brush, short, rapid stroke, light contact, move in the direction of the efferent lymphatics, continuing down the neck to the clavicle. Then, the cushioned applicator with rapid, medium length stroke and medium pressure, on lymph nodes of face and neck. Every second day until improved. Then, twice a week. Cure requires 6 to 10 weeks.



## ADENITIS

**Radiant Heat:** Expose for one to three hours per day, limiting the heat by means of screens containing openings, to the gland and a small surrounding area. This may be used even on a suppurating gland to direct the necrosis toward the surface.

**Diathermy:** Cut a block tin sheet so that it will cover an area slightly larger than the gland. The opposite electrode should be five to ten times larger than the one over the gland, and should be as nearly as possible on the opposite side of the body. Do not exceed 100 ma. per square inch of the smaller electrode. A lower degree of heat for a longer time is more effective.

**Ultraviolet Light:** Precede by radiant heat for 20 minutes. Air-cooled, 2 to 10 minutes, at 30 to 5 inches. Water-cooled,  $\frac{1}{2}$  to 3 minutes, 2 inches to contact. Daily at first, increasing intervals to weekly. Blister heavily. If general condition requires it, expose entire body to air-cooled lamp.

**Vibration:** Soft rubber brush or cushioned applicator, rapid, short stroke, medium firm pressure over the glands and efferent lymphatics. The amount of pressure depends on whether the lymphatics are superficial or deep. Stimulating technic on corresponding spinal centers.

On suppurating glands, after incision and drainage, the above can also be used. Also:

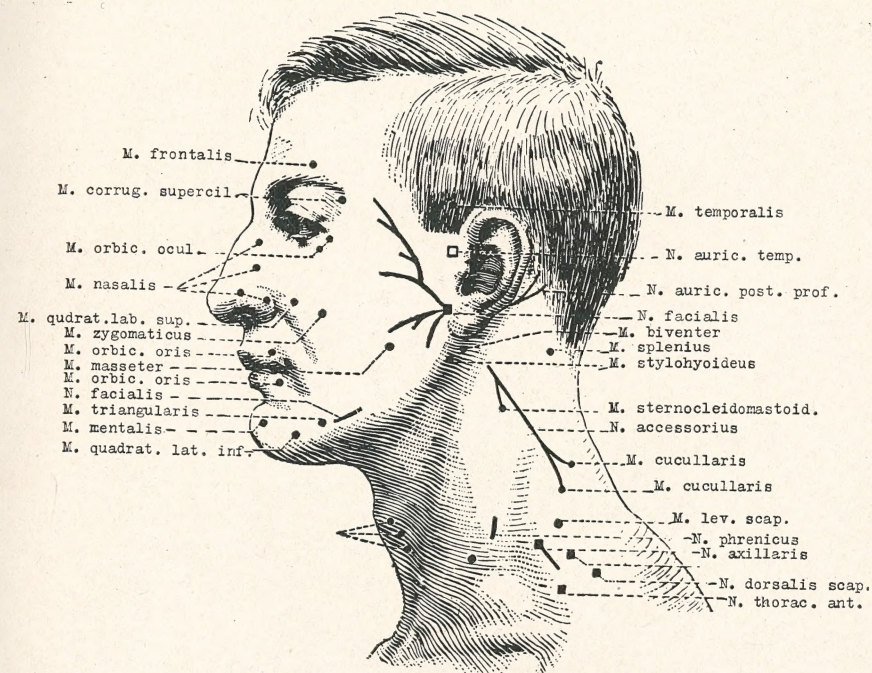
Ionization of Zinc: (see technic under *Abscess*).

## ADENOMA

**Ultraviolet Light:** Precede with 20 minutes exposure to radiant lamp. Air-cooled lamp, 2 to 20 minutes, 30 to 10 inches. Water-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 1 inch to contact. Daily to three times a week; local and general. Blister.

**Galvanic Current:** Positive (pad) electrode over the tumor; negative pole, a larger pad, at a considerable distance on the body from the tumor. Current intensity as high as the patient will tolerate; 30 minutes.

In some cases, reduction in size of the tumor is possible. A long time is required.



Motor Points of the Head and Neck



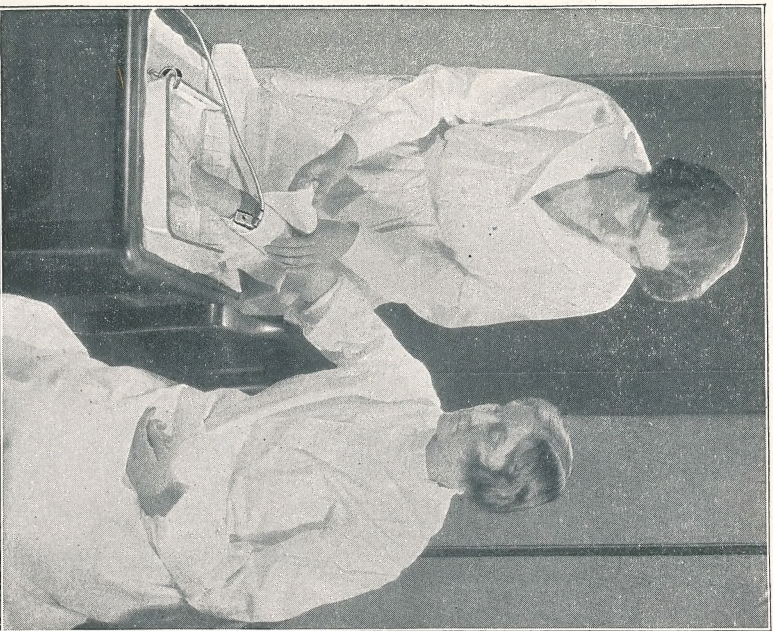


Illustration 1.—Diathermy to wrist, cuff above and hand in tray of salt solution.

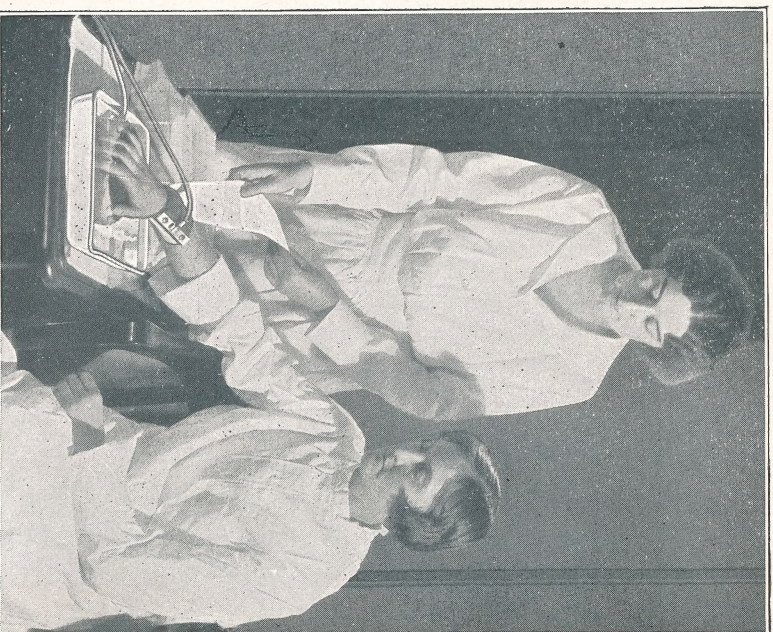


Illustration 2.—Diathermy to wrist, cuff above and fingers in tray of salt solution.



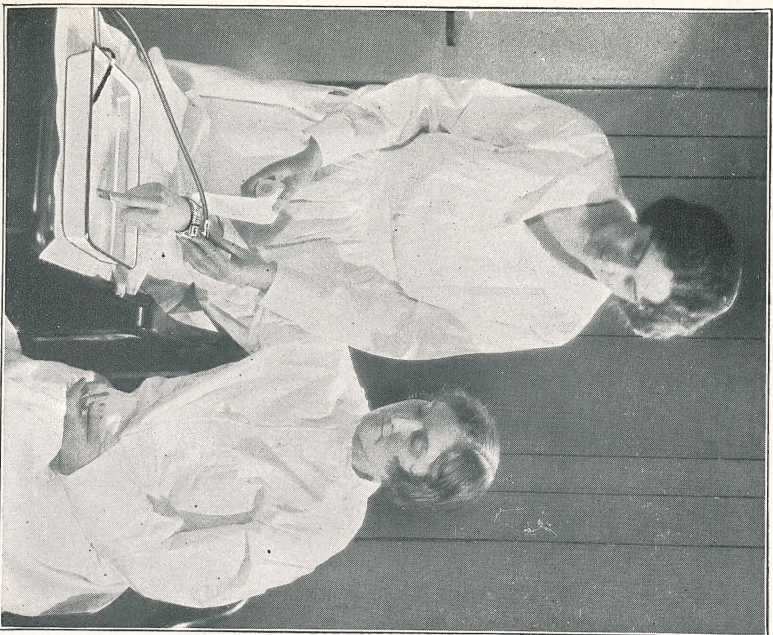


Illustration 4—Diathermy to finger cuff about wrist, finger in salt solution.

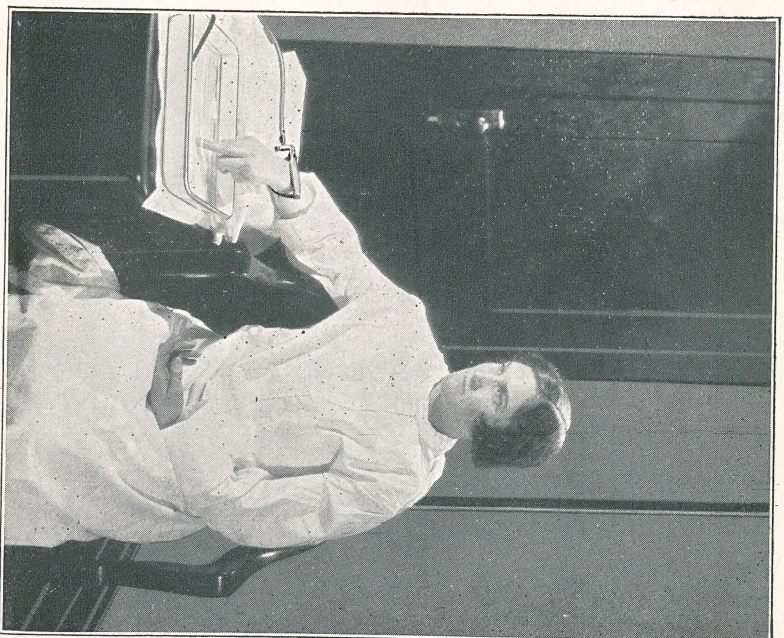


Illustration 3—Diathermy to finger, metal electrode held in contact with wrist by an elastic band, finger in salt solution.



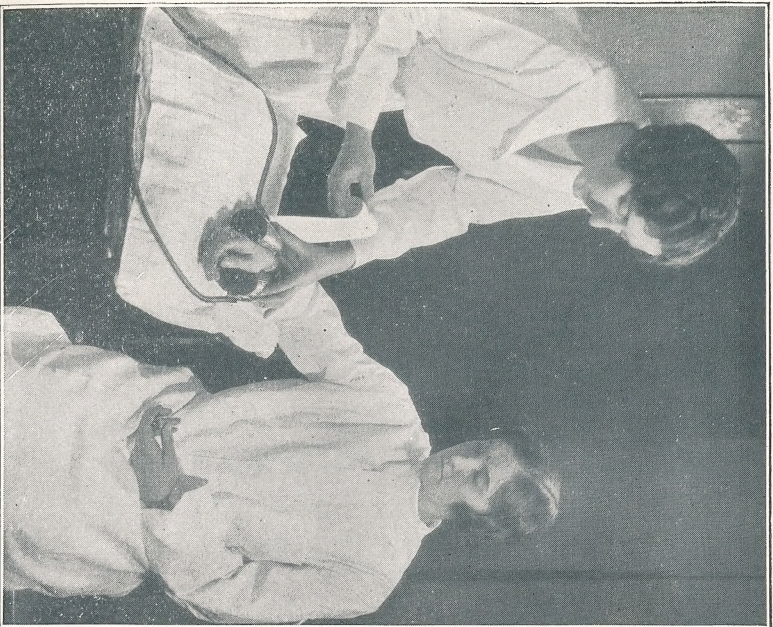


Illustration 5—Diathermy through wrist sponge electrode on flexor and extensor surfaces held in place by elastic band-  
age.

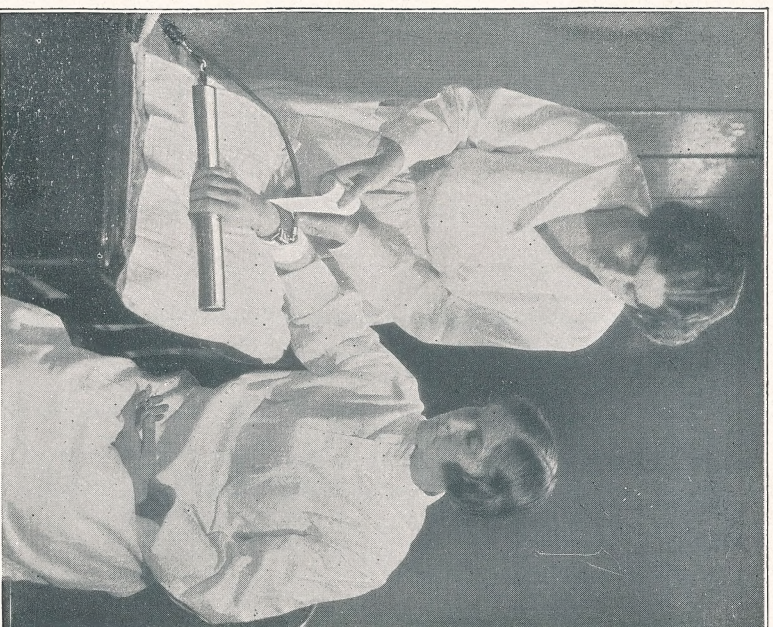


Illustration 6—Diathermy to wrist, cuff above, hand grasping  
metal electrode.



## ADHESIONS, Post-operative, Intra-abdominal and Pelvic.

**Diathermy:** Remember that the heat is distributed in straight lines between the electrodes, and is greatest in points nearest to the smaller electrode, and also in tissues of highest resistance, as bones and connective tissue. The intensity of the current should not exceed 100 ma. per square inch of the smaller electrode.

**High Frequency:** Vacuum tube, with a current intensity capable of producing  $\frac{1}{2}$  inch spark, in light contact with the skin, and kept constantly in motion. For pelvic adhesions use the vaginal electrode.

**Surging Sinusoidal (Morse Wave):** Electrodes placed opposite each other, one in front and one behind, with the area of adhesions between them. The smaller (pad) electrode is to be placed on that surface to which the adhesions are supposed to be nearest, usually the anterior or abdominal surface. Current intensity to patient's toleration. About 10 surges per minute, for 20 or 30 minutes.

**Vibration:** Long, slow stroke, with deep pressure; vibratode of broad area; percussion stroke.

The above four modalities in the order given, make an excellent combination.

**Galvanism:** The negative pole softens and loosens. Chlorine or iodine ionization have been recommended, but it is doubtful if they penetrate farther than a centimeter below the surface.

**Ultraviolet Light:** Precede by 20 minutes' exposure to the radiant lamp. Air-cooled lamp only;  $\frac{1}{2}$  to 5 minutes, 30 to 10 inches. Daily, to three times a week. General exposure.

## ALBUMINURIA, Due to Nephritis (q. v.)

Autocondensation daily.

**High Frequency sparks** over lower dorsal and lumbar vertebrae. Or, breeze to the spine from multiple-pointed electrode. Vacuum tube over region of kidneys.

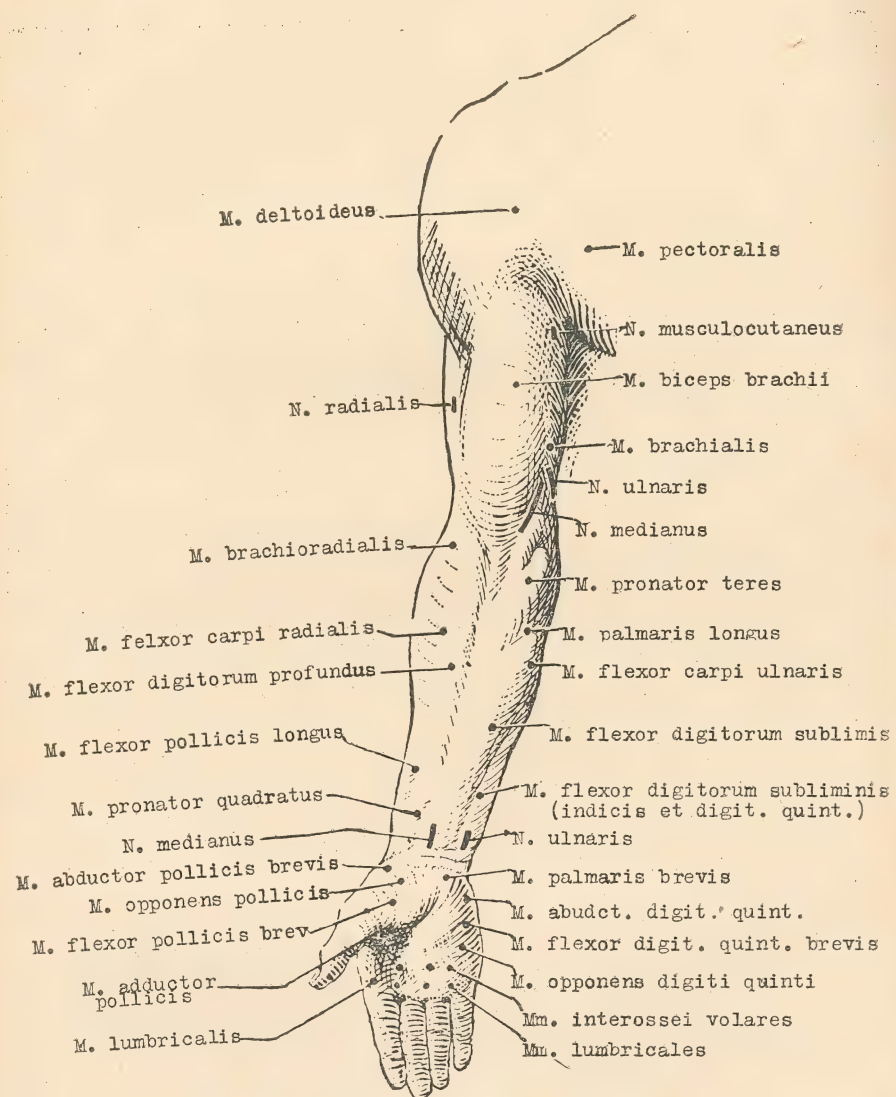
**Diathermy** through kidneys and liver.

**Vibration:** Stimulative technic to lower dorsal and all lumbar vertebrae. Mild stimulative technic over kidneys.

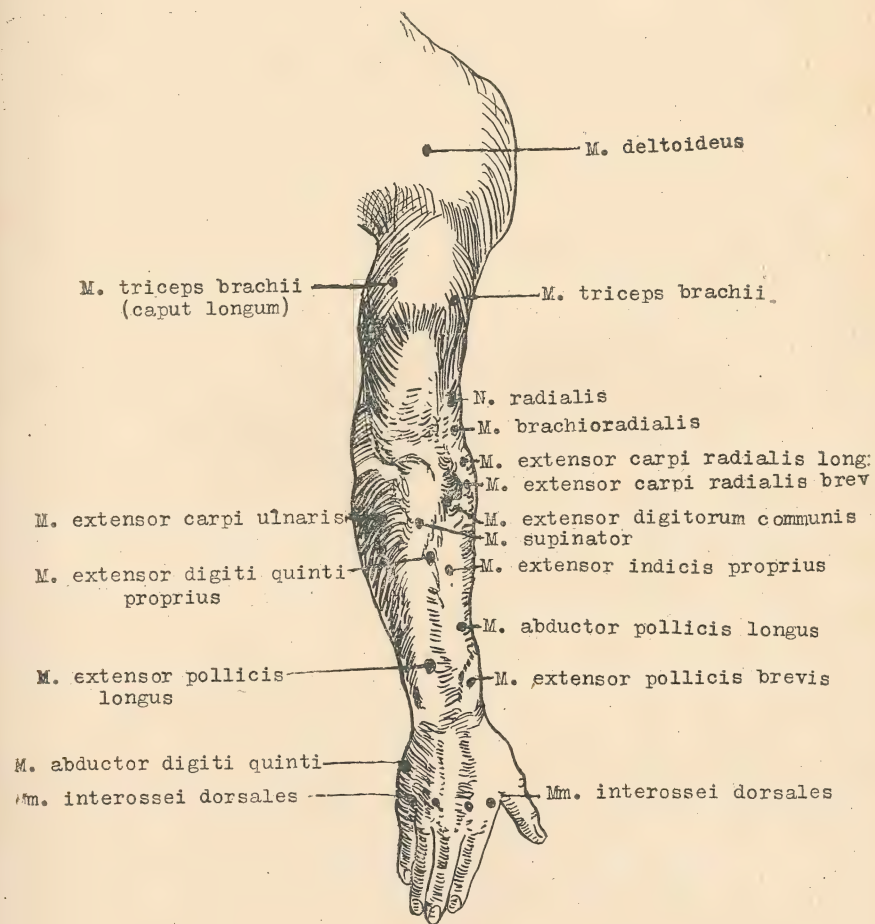
## ALOPECIA

**High Frequency:** Vacuum tube, with current intensity capable of producing a  $\frac{1}{4}$  to  $\frac{3}{4}$  inch spark; ordinarily in light contact, but





Motor Points of Upper Extremity, Anterior Surface



Motor Points of Upper Extremity, Dorsal Surface



raise occasionally to produce a spark. Treat 5 to 10 minutes daily; treatments should be of sufficient length and strength to produce an active hyperemia.

**Vibration:** Soft rubber brush applicator, rapid, short lateral stroke, medium pressure, going over each point five or six times. Follow by ultraviolet.

#### Ultraviolet Light:

Air-cooled, 3 to 10 minutes, at 10 inches. The dosage is difficult to predict, as the amount of hair that is present absorbs a large amount of the light; it is necessary that an attendant constantly move the hair about so that the bare scalp may be exposed to the light. Endeavor to produce a moderate reaction; and give each treatment after the reaction from the preceding one has begun to subside.

Syphilitic alopecia will not respond to physiotherapeutic methods. Hereditary and senile forms respond if treatment is begun early, when thinning has just begun.

## AMALGAMATION

Use copper and zinc electrodes. Grind the surface of the electrode smooth and polish with sand paper and steel-wool. Rub with a piece of cotton soaked with dilute HCl. Dip into mercury (pure metallic) and a few globules of the mercury will adhere to the electrode. Rub again with the cotton soaked with dilute HCl, until the mercury is evenly distributed over the entire surface of the electrode.

#### Advantages of Amalgamation:

Smoothness enables it to be readily introduced.

Does not require reversal of current for removal, as it will not adhere.

Introduces the mercury ion, which is astringent and antiseptic.

**Vibration:** Ball Vibratode; medium length, high speed, medium pres-

## AMENORRHEA

**High Frequency:** "Insulated" vaginal vacuum electrode, current intensity so that patient can feel warmth; avoid a high heat, not over seven minutes. Three to six times a week.

**Vibration:** Ball Vibratode; medium length, high speed, medium pressure percussion stroke, 20 seconds each over posterior roots of all lumbar, and lower four dorsal spinal nerves.

Rapid, medium pressure, lateral stroke for two or three minutes over each ovary.

Every second or third day. Do not vibrate too long or too heavily, otherwise inhibition results.

#### Ultraviolet Light:

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.

General; twice a week. Do not blister.

**Galvanism:** Negative pole over hypogastrium; larger, positive pad over sacrum; current intensity to toleration, for 10 minutes. Sinusoidal surges, 10 per minute, for 3 minutes. Every third day.

Additional treatment will depend upon the etiology, which, broadly speaking, can be divided into three divisions; debility, endocrine, and local. Therefore, see *Uterine Malposition, Anemia, Tuberculosis*, etc.

## ANALGESIA

**High Frequency:** A local analgesia may be produced by means of the high-frequency discharge. Use a tube with the degree of vacuum that produces a pinkish-violet fluorescence. Do not use sparks; keep in direct contact with the skin.

## ANEMIA

**Ultraviolet Light:** A thorough tanning of the entire skin surface is of great assistance in building up hemoglobin. Authorities differ as to whether or not it is advisable or necessary to precede the ultraviolet lamp with the radiant heat lamp. Plank uses the radiant lamp, while Sampson produces excellent evidence to show that not only is it not necessary, but less effective. The writer has found by accurate observation of carefully planned experiments, that results without radiant heat are at least equal to those with it.

Use the air-cooled lamp, at about 30 inches, over the entire naked body, beginning with a two to five minute exposure, and increasing according to the patient's reaction, daily to twice a week, until the patient is thoroughly tanned. This may require from ten to twenty exposures. Avoid producing severe reactions with blisters and swelling.

To determine the original dose, see *Ultraviolet Light, Testing Patient's Tolerance*.

**Diathermy** of the long bones, in the arm and leg, by means of cuffs, increases the formation of red blood cells.

#### Ozone inhalation

**Autocondensation:** Some of the older writers state that the general metabolic stimulation is useful in anemic states. Low blood pressure is a contra-indication to autocondensation.

## ANEURYSM

**Galvanism**, to promote coagulation within the sac. A gold or platinum wire is introduced into the sac, a considerable length of it being allowed to coil up within. The wire is connected with the positive pole, the negative electrode being placed anywhere on the body, and the current gradually increased to 40 to 50 ma. and



again gradually decreased to zero, consuming a total time of 45 to 90 minutes. Further details of technic may be found in works on surgery.

## ANGINA PECTORIS

Autocondensation if there is hypertension, q. v.

Diathermy: The literature contains a number of enthusiastic reports of the relief of anginal pains and a lessening of the frequency of the attacks by means of cardiathermy.

Use two block-tin electrodes about 5 inches square, one directly over the heart, and the other in the back, directly opposite. Begin with 400 to 600 ma., and gradually increase to 1000 ma. Treat for 10 or 12 minutes.

Vibration: Rapid, medium length percussion stroke, medium pressure, on second, third, fourth and fifth cervical posterior spinal nerve roots, using ball applicator; also same stroke to posterior angles of third, fourth and fifth ribs, to reach the sympathetics.

Ball applicator, rapid, short stroke, deep pressure, intermittently on anterior edge of sterno-mastoid muscle, just above where it crosses the omo-hyoid, pressing inward and downward at the top of the sternum. Do not treat over 15 or 20 seconds.

## ANGIOMA

Galvanism: Use a platinum needle, insulated near its tip, so that the insulated portion is through the skin, and does not act on the skin, while the bare tip is in the blood vessel. This may be improvised at home by melting up a phonograph record and dipping the needle into the fused material; and after cooling and hardening, the tip may be cleaned off for a sixteenth of an inch, and the entire needle gently smoothed with a fine file. The needle is the positive pole; the negative pole may be held in the hand, or placed on the back. Current intensity, 20 to 25 ma. for 4 or 5 minutes. This technic will destroy the blood vessel and preserve the skin.

Ultraviolet Light: Water-cooled lamp, 1 to 5 minutes in contact, blistering heavily. Repeat when reaction from first treatment has subsided.

## ANGIONEUROTIC EDEMA

Ultraviolet Light: As this condition is an anaphylactic reaction, involving a disturbance of calcium metabolism, ultraviolet should be very useful.

Expose the entire body to the air-cooled lamp, at a distance of 30 inches, timing exposure so as to secure a reaction similar to a first degree sunburn, and repeating when the reaction has begun to subside. Continue till the entire body is thoroughly tanned. Avoid severe reactions with blisters and swelling.

To determine initial dose, see *Ultraviolet Light, Testing Patient's Tolerance*.

The lesion itself may be treated locally with the water-cooled lamp, for  $\frac{1}{4}$  to 2 minutes, at a distance of 1 or 2 inches, aiming to secure a moderate reaction without blistering.

## ANKYLOSIS

Diathermy: By means of cuffs, above and below the joint.

Ultraviolet Light: Precede by exposure for 20 minutes to the radiant lamp.

Air-cooled,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.

Water-cooled,  $\frac{1}{4}$  to 3 minutes; 2 inches to contact.

Daily to three times a week; local and general.

High Frequency: Adjust current intensity for a spark about an inch long. Do not keep the electrode in contact with the skin, but approach and withdraw quickly, so as to give individual sparks of short duration, each of which causes the muscles to give a jerk.

X-ray in "ionizing" doses (Sampson).

Vibration: Stimulating technic to the corresponding spinal center; medium or long percussion stroke, medium to deep pressure.

Shoulder, 4th and 5th cervical.

Elbow, 4th, 5th, 6th and 7th cervical.

Hip, 4th and 5th lumbar.

Knee, 2nd and 3rd lumbar.

Over the joint, use the brush vibratode, with lateral stroke and moderately high speed.

Vibro-massage, with rotary or lateral stroke, in long sweeps along the course of the blood vessels toward the heart, to promote venous drainage; and along the efferent lymphatics, to promote lymphatic circulation.

## ANTEVERSION

See under *Prolapse*.

*Backache*.

*Uterine Malposition*.



## ANTHRAX

### Ultraviolet Light

Precede by exposing 20 minutes under the radiant lamp.  
Air-cooled lamp,  $\frac{1}{2}$  to 10 minutes, 30 to 15 inches.  
Water-cooled lamp,  $\frac{1}{4}$  to 10 minutes, 3 inches to contact.  
Daily. Blister heavily.  
Also general exposure.

## APPENDICITIS, Catarrhal

Diathermy is indicated in a case that is known not to be suppurative. The leukocyte count is the guide to this. Diathermy on enclosed pus is dangerous.

High Frequency from the unipolar or Oudin terminal; glass vacuum electrode kept in contact with the skin; current intensity arranged to patient's tolerance.

### Ultraviolet Light:

Radiant lamp for 30 minutes.  
Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.  
Water-cooled,  $\frac{1}{4}$  to 3 minutes, contact.  
Daily.  
Also general exposures.

## ARTERIOSCLEROSIS

See *Hypertension, Organic Stage.*

## ARTHRITIS, Acute.

See also *Arthritis, Chronic.*

Radiant Lamp: 30 minutes to several hours. daily.

Diathermy: by means of cuffs above and below joint. Mild intensity and long time, are the best.

Infrared: Moderate intensive to mild prolonged, several hours daily.

## ARTHRITIS, Chronic

Create an acute process out of the chronic one, and then treat as an acute process q. v. Necessarily, the patient will be worse for a while. The main requirement is to produce hyperemia.

### Radiant Lamp.

Diathermy, by means of cuffs, above and below the joint; about 100 ma. per square inch of the electrode, 30 minutes at a time, one or more times a day.

High Frequency: Same technic as under acute arthritis.

Ionization (q. v.) of chlorin, 50 to 60 ma., 30 to 60 minutes.

### Ultraviolet Light:

Precede by 20 minutes exposure to radiant lamp.  
Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.  
Water-cooled lamp,  $\frac{1}{4}$  to 2 minutes: 1 inch to contact.  
Daily. Do not blister.  
Also general exposure of entire body.

Infrared: Moderate intensive or mild prolonged, several hours daily.

Vibration: Stimulating technic to the corresponding spinal center; medium or long percussion stroke, medium to deep pressure.

Shoulder—4th and 5th cervical.

Elbow—4th, 5th, 6th and 7th cervical.

Hip—4th and 5th lumbar.

Knee—2nd and 3rd lumbar.

Over the joint use the brush vibratode with lateral stroke and moderately high speed.

Vibro-massage, with lateral stroke, in long sweeps along the course of the blood vessels toward the heart, to promote venous drainage; and along the efferent lymphatics, to promote lymphatic circulation.

Massage and manipulation.

Keep up elimination.

Mild reaction with ultraviolet light.

Autocondensation.

Hydrotherapy.

## ASTHMA

High Frequency: Vacuum tube over the chest through a sheet or a layer of gauze; as sharp a spark as the patient will endure. Also over the posterior cervical region, especially over the 4th and 5th cervical vertebrae.

Diathermy through the chest, best to take one lung at a time.

General radiation of the body with ultraviolet light. This is beneficial when the asthma is an anaphylactic reaction, the latter being a disturbance of calcium metabolism, and amenable to ultraviolet light.

Ozone inhalation.



**Surging Sinusoidal (Morse Wave):** One electrode over 4th and 5th cervical vertebrae, and the other over the sacrum; current intensity to patient's tolerance; 15 to 30 minutes every day or every second day.

**Ultraviolet Light:**

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.

Daily to three times a week. Do not blister. Expose the entire body.

**Vibration:** Ball vibratode, medium percussion stroke, medium speed, all cervical and dorsal centers, three or four times each, and double that over the sensitive areas found. Stimulate the vagus, anterior to the middle portion of the sterno-mastoid muscle. With the patient lying relaxed, use the brush over the pectoral muscles, toward the sternum and axillae.

## ATHETOSIS

**Galvanism:** Negative pole to cervical vertebrae, positive to forehead. Or, positive to cervical region, and negative to the hand and foot of the affected side.

## ATONY, MUSCULAR

**Sinusoidal Current:** Use a make and break key, and stimulate the atonic muscle.

Depending on the etiology, other modalities will be found useful.

## ATROPHY, MUSCULAR

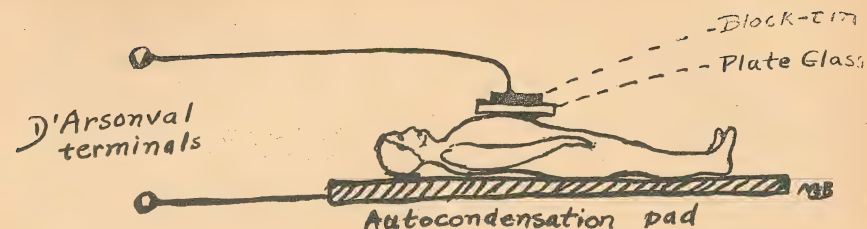
if due to peripheral nerve injury, the object of treatment is to keep up the nutrition of the muscle until the nerve regenerates.

**Sinusoidal Current:** To be used if the nerve is functioning, to stimulate the muscle to movement, keep up the flow of blood and lymph, to promote nutrition and elimination.

**Galvanism:** With arrangement for make-and-break, to be used when reactions of degeneration are present.

Do not overwork, fatigue, or tetanize the muscle.

**Vibration:** Convex, hard applicator, rapid, short stroke, medium pressure; roll the muscle over its entire length. Also stimulate the spinal nerve roots supplying the muscle. Every second day for two weeks, then twice a week thereafter, as long as any improvement is noticeable.



## AUTOCONDENSATION CONTRA-INDICATIONS

Advanced arteriosclerosis.

Extreme old age.

Fevers.

In the above conditions, the unipolar applicator may be safely used.

## AUTOINTOXICATION

**Ultraviolet Light:** Radiant lamp for 20 minutes.

Air-cooled,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.

General exposure, daily to 3 times a week.

**Autocondensation:** Precede by copious draughts of water.

**Surging Sinusoidal (Morse Wave):** Over abdomen, to promote activity of bowel musculature, and blood and lymph drainage of the portal tract.

**Vibration:** Hard ball vibratode, long percussion stroke, deep pressure over abdominal area.

## BACKACHE

May be due to any of the following causes, which see:

Female pelvic disease.

Uterine malposition.

Metritis, endometritis.

Ovaritis.

Prostatitis.

Sacro-iliac arthritis.

Flat feet.

In backaches due to fatigue, strain, or debility, the following furnishes effective relief:

**Radiant Lamp:** For 30 minutes.



**Vibration:** Hard ball vibratode, percussion stroke, short and rapid, at the sides of the spine and over the large muscle groups, for 5 or 10 minutes.

## BARTHOLINITIS

**Ultraviolet Light:** Radiant lamp for 20 minutes.

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 10 to 5 inches.

Water-cooled lamp,  $\frac{1}{4}$  to 3 minutes, 1 inch to contact.

Daily. Do not blister.

## BLEPHARITIS

**High Frequency:** Adjust current intensity for a spark  $\frac{1}{32}$  to  $\frac{1}{16}$  inch long, and give the sparks from a pointed vacuum electrode along the edge of the lid for 2 minutes. Then two minutes' contact with a larger electrode, over closed eyelid. Daily, to two or three times a week.

## BRONCHIECTASIS

**Vibration:** Stimulating technic (see *Vibration*) to 4th and 5th cervical vertebrae.

**Surging Sinusoidal:** Small pad electrode on 4th and 5th cervical vertebrae; larger pad electrode on the chest, approximately over the location of the dilated bronchus; current intensity to patient's toleration; about 20 surges per minute.

Diathermy through the region of the dilated bronchus.

## BRONCHITIS, Acute and Chronic

In acute bronchitis, the treatments should be intense, short, and few in number. In chronic bronchitis, they are the reverse, milder, longer, and a large number of treatments is required.

**Radiant Lamp:** 30 minutes to two hours.

Ozone inhalation.

**High Frequency:** Sharp sparks, made by approaching the electrode to the skin and quickly withdrawing, to chest and back until well reddened; repeat every hour until sufficient congestion is obtained.

Illustration 12—Diathermy to shoulder, patient lying in dorsal position, electrodes held in position by sandbags.

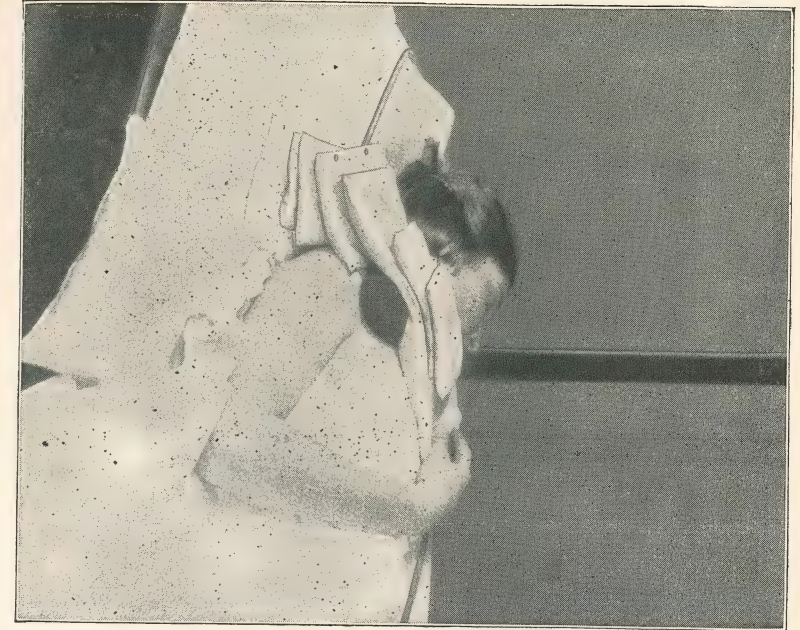


Illustration 11—Diathermy to shoulder, electrodes held in place by clamp.

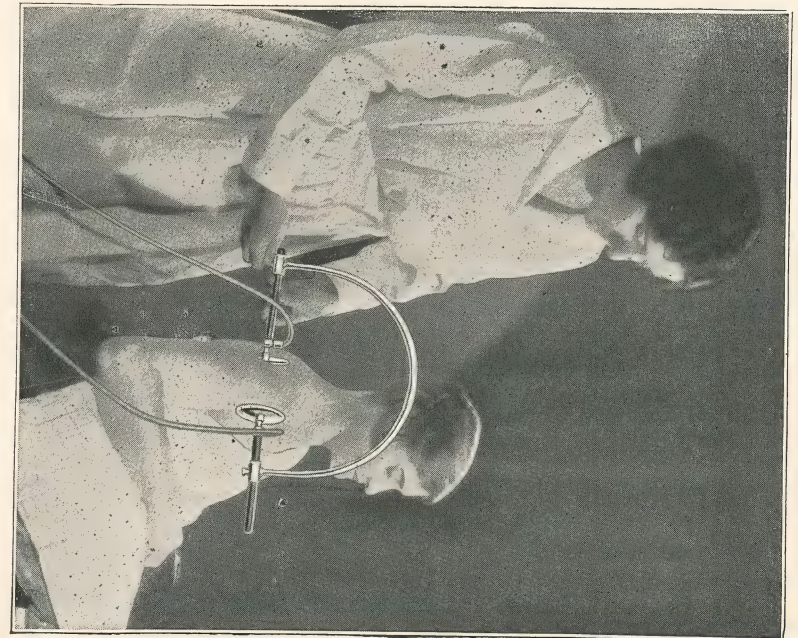






Illustration 13—Diathermy to both ankles, one cuff electrode about each ankle, toes in salt solution.



**Diathermy:** One application will relieve an acute condition if given early enough. Block-tin electrodes on back and front of chest. Begin with 300 to 500 ma., and gradually increase to 1000 or 1500 ma., for 15 minutes or longer.

**Surging Sinusoidal:** 6 by 8 inch pad electrode on the back, and a 4 by 5 pad below the clavicle, toward the mid-line. The two sides may be treated at the same time by means of a bifurcated cord for the two electrodes in front; but better results are obtained by treating each side separately. Current intensity to patient's toleration; about 20 surges per minute.

**Ultraviolet Light:** Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, at 30 to 15 inches; general. This is effective in chronic conditions; the writer has not found it so in acute conditions.

**Vibration:** Rapid, medium-length percussion stroke to posterior nerve roots, from 2nd to 9th dorsal. If sensitive spots are found, use inhibitory technic on them.

Also, cushioned applicator over liver and spleen.

Lateral or rotary stroke, short length, high speed, over the chest.

## BRUISES

Radiant Lamp.

Ultraviolet Light: Precede by radiant lamp, 20 minutes.

Air-cooled lamp, 1 to 5 minutes, 30 to 15 inches.

Water-cooled lamp,  $\frac{1}{4}$  to 3 minutes, 1 inch to contact.

Mild reactions daily; do not blister.

Infrared: Short intensive treatment, 10 to 15 minutes, daily.

## BUBO

Technic under *Abscess* and *Adenitis* is applicable here.

## BUNIONS

Ultraviolet Light:

Air-cooled,  $\frac{1}{2}$  to 5 minutes, 20 to 10 inches.

Water-cooled,  $\frac{1}{4}$  to 3 minutes, 1 inch to contact.

Blister lightly, twice a week.



## BURNS

Ultraviolet Light: Precede by radiant lamp, 30 minutes.  
Air-cooled,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.  
Water-cooled,  $\frac{1}{4}$  to 1 minute, 2 inches.  
Secure a mild reaction, without blistering; daily.

Infrared: Short, intensive.

## BURSITIS

Infrared: Moderate intensity and long time.

Diathermy: If on elbow or knee, the cuff method of application is best. On shoulder, the indirect method will be preferable. Connect up the autocondensation pad, and lay the patient on it; and apply the block-tin electrode over the inflamed bursa. Moderate heating, for a long period.

Vibration: Firm pressure with soft applicator, short, rapid, lateral stroke, 10 minutes daily.

Ultraviolet Light: Radiant lamp for 20 minutes.  
Air-cooled  $\frac{1}{2}$  to 10 minutes, 30 to 15 inches.  
Water-cooled,  $\frac{1}{4}$  to 5 minutes, 2 inches to contact.  
Blister and repeat when reaction has begun to subside.

## CALCIUM METABOLISM

Experimental evidence indicates that the ultraviolet light stimulates and increases calcium metabolism. By that we mean that there is an increased absorption of calcium from the food, and an increased utilization of it for the particular purposes for which it is required in the body. The following is a list of diseases in which the calcium metabolism is deficient, and in which therefore, improvement is to be expected from exposure to ultraviolet light:

1. Anaphylaxis
2. Tetany
3. Cancer
4. Rickets
5. Bone diseases
6. Fractures
7. Hay fever
8. Asthma
9. Eczema and numerous skin diseases
10. Angioneurotic edema

## CARBUNCLE

The technic, indications, and contra-indications for the various modalities, are the same as for *Abscess*, q. v.

## CARCINOMA, Superficial or Accessible

Fulguration, or sparks from the unipolar terminal, delivered from a metal electrode, will suffice for very superficial growths, of small size.

Electro-Coagulation, or Surgical Diathermy, is necessary for larger growths. The technic will vary with the location of the tumor, and can be given here only in general terms.

Local or general anesthesia will be necessary. Two methods of securing the coagulation are open to choice.

1. An indifferent electrode at some distant portion of the body; its area must be many times that of the active electrode. The current is thus concentrated at the operating electrode.

2. Two equal electrodes placed at opposite sides of the lesion, with the current acting between them.

The first method is used when the tumor is removed by destroying a zone of tissue around it. The second method will destroy all of the tissue between the electrodes.

Refer also to *Diathermy, Surgical*.

Ultraviolet light, following the electro-coagulation, will be of marked assistance in healing. Precede by 20 minutes of the radiant lamp; use the air-cooled lamp in preference to the water-cooled; give mild exposures, low intensity and long duration; secure mild reactions frequently repeated. General exposure is also desirable.

## CATAPHORESIS

See also *Ionization*.

The ion that is *attracted* to the particular pole in use, remains on the electrode. The ion that is *repelled* by the pole, penetrates into the tissues.

Substances introduced with the positive pole:

Iodin, bromin, chlorin  
Salicylic acid  
Acid radicals

Substances introduced with the negative pole:

Metals  
Morphine, cocain, adrenalin



### Alkaloidal radicals Thiosinamin

A substance may be injected with a hypodermic needle, and the latter left in place and used as an electrode.

## CATARACT

High Frequency: Glass vacuum eye electrode. Avoid producing sparks. Make and break the current with the electrode in place, preferably by means of a foot switch.

Galvanism: Negative pole, consisting of a pad of gauze saturated with 1 per cent sodium chloride solution, or sodium iodide solution, the metal contact being made with a strip of lead or block tin. Positive pad over cervical vertebræ, 2 to 4 ma. of current.

Benefit is to be expected in the early stages, by long and patient effort.

## CATARRH, NASAL

See under *Hypertrophied Turbinates*.

## CELLULITIS

Radiant Lamp.

Diathermy, for prolonged periods.  $\frac{1}{2}$  to 2 or 3 hours.

High frequency, through the dressings.

Ultraviolet Light: Precede by exposure to radiant lamp for 30 minutes, minutes.

Air-cooled lamp, 2 to 10 minutes, 20 to 10 inches.

Water-cooled lamp,  $\frac{1}{2}$  to 3 minutes, 1 inch.

Daily, local and general.

Do not allow physiotherapeutic methods to eclipse the surgical requirements.

## CEREBRAL ANEMIA

Vibration: Ball vibratode to posterior nerve roots, from second cervical to fifth dorsal; percussion stroke, deep pressure, medium length 30 to 40 seconds or more over each point, for inhibitive effect.

Then lateral stroke with brush or soft rubber vibratode or rubber cup, light pressure, 1 or 2 minutes over occiput and sides of the neck, medium speed.

Illustration 12—Diathermy to shoulder, patient lying in dorsal position, electrodes held in position by sandbags.



Illustration 11—Diathermy to shoulder, electrodes held in place by clamp.

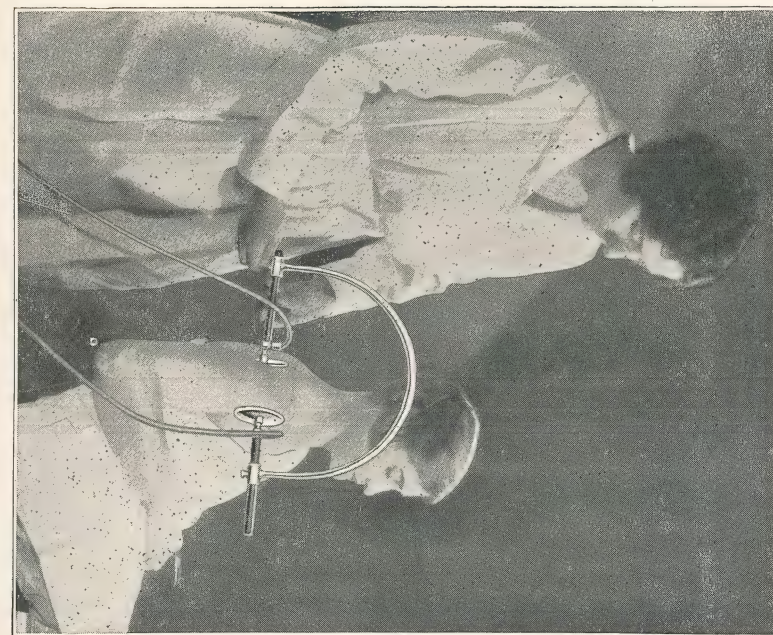






Illustration 13—Diathermy to both ankles, one cuff electrode about each ankle, toes in salt solution.



## CEREBRAL HYPEREMIA

Vibration: Ball vibratode, percussion stroke, medium length, firm pressure. all cervical to fifth dorsal posterior nerve roots, 6 to 15 seconds each.

Then lateral stroke, over the sympathetic nerves, in the anterior cervical region; brush or soft rubber applicator, 20 seconds over each point. Avoid vagus inhibition, which may be disastrous.

Lateral stroke, medium length, high speed, to extremities.

## CEREBRAL PALSY

Galvanism: Positive pad to forehead; negative pad to back of neck; current intensity to toleration; 30 minutes daily. Begin with lowest possible current strength and increase very cautiously. The effect is the absorption of inflammatory tissue, and the increase of nutrition.

The results to be hoped for will depend on the character and extent of the pathology. If the necessary brain cells have been destroyed, there is no hope of return of function.

## CERVICITIS (Uteri)

See also, *Cervix. Stenosis of*

Diathermy: Corbus electrode. It is better to use the patient's sensation of heat as a guide, rather than the thermometer.

High Frequency: "Insulated" vaginal electrode of the glass vacuum type. Or, a small vacuum electrode which can be inserted into the cervix, to be used in conjunction with the above. Adjust current intensity until the patient feels a moderate warmth. Do not permit the electrode to get too hot while in the vagina. Do not make the treatments longer than seven minutes.

Vibration: A special attachment which will extend up into the vagina and fit over the cervix may be used.

Stimulative technic to lumbar and sacral vertebræ.

Ionization (q. v.): Silver, mercury, copper, or zinc, at the positive pole; or iodine at the negative pole. Formulae for solutions will be found under *Ionization* and *Cataphoresis*. If the positive pole is used intracervically, reverse the current for a few moments before removing the electrode, to release the adhesion which is formed during the passage of the current. Or use an electrode that has been *amalgamated*, (q. v.) Use 5 to 25 ma. for 5 to 10 minutes, every third to seventh day.



**Ultraviolet Light:**

Air-cooled lamp, 1 to 5 minutes, 10 to 5 inches.

Water-cooled, 3 to 10 minutes.

Three times a week.

Special applicators should be used, which prevent the action of the light on the vaginal walls and the exterior parts.

**CERVIX, STENOSIS OF (Uteri)**

See also, *Cervix, Inflammation of.*

**Galvanism:** Use a graduated, or tapering metal electrode, with a slight cervical curve. This is used as the negative pole, through a glass vaginal speculum. The positive pad may be on the abdomen. With a little pressure on the electrode, it can gradually be pushed upwards, and the cervix dilated, as the current is increased. Turn the current on gradually, up to 8 or 10 ma. Avoid excessive pressure, and avoid cauterization, as scar tissue will result.

Strict asepsis must be observed in using the negative pole in the uterine canal; the relaxation and vaso-dilatation predisposes to infection. This care in observing asepsis is not required in the use of the positive pole.

**Vibration:** For technic, see under *Cervicitis.*

**Ionization (q. v.):** For technic, see *Cervicitis.*

**Ionization of thiosinamin:** For the positive electrode, a hollow rod is used, ending in a hollow, perforated, hard rubber ball, containing cotton soaked in a thiosinamin solution. For further details, see *Scars.*

**CHANCROID**

These methods are ineffective in chancre.

**Fulguration:** First paint with 25% copper sulphate solution. Fulgurate to superficial cauterization. One treatment is usually sufficient. A local anesthetic may be required.

**Ionization of Copper:** Lay on the lesion, a gauze pad soaked with a 10 per cent copper sulphate solution, and over this a lead or tin strip, connected with the positive pole. The negative pole may be on the abdomen. Use about 10 ma. for 10 or 15 minutes. Repeat in two or three days if necessary.

**Ultraviolet Light:** Water-cooled lamp for 1 to 3 minutes at 1 inch. Secure moderate reaction, and repeat daily or every second day. Two or three weeks will be required. Clean off the secretions as

far as possible before exposure, as they obstruct the action of the light.

**CHILBLAINS**

**High Frequency,** with a current intensity capable of producing a  $\frac{1}{4}$  to  $\frac{1}{2}$  inch spark, but keep in contact with the skin 10 minutes daily.

**Radiant Lamp.**

**Diathermy:** The indirect diathermy (q. v.) is best in this case. The local electrode should be a sheet of heavy tinfoil, closely and carefully fitted to the contour of the parts.

**Ultraviolet Light:**

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 20 to 10 inches.

Water-cooled lamp,  $\frac{1}{4}$  to 3 inches; 1 inch to contact.

Daily. Produce an erythema. Local only.

**CHOLECYSTITIS**

If gallstones are present, physiotherapy is merely palliative, and sooner or later, surgery will be required.

**Radiant Lamp.**

**Diathermy:** Block-tin electrode about 4 by 4 inches over the gall bladder, and one about 6 by 8 inches on the back directly opposite; 1000 to 1500 ma. for 30 minutes, daily.

**Surging Sinusoidal:** Technic as given under *Constipation.*

**Ultraviolet light:** Radiant lamp, 20 minutes.

Air-cooled lamp, 2 to 5 minutes, 20 to 10 inches.

Water-cooled lamp,  $\frac{1}{2}$  to 3 minutes, at 1 inch.

Daily; local and general.

**Vibration:** Rapid, medium-length stroke, medium pressure on vertebrae from 3rd to 9th dorsal, dwelling especially long on the 7th and 8th.

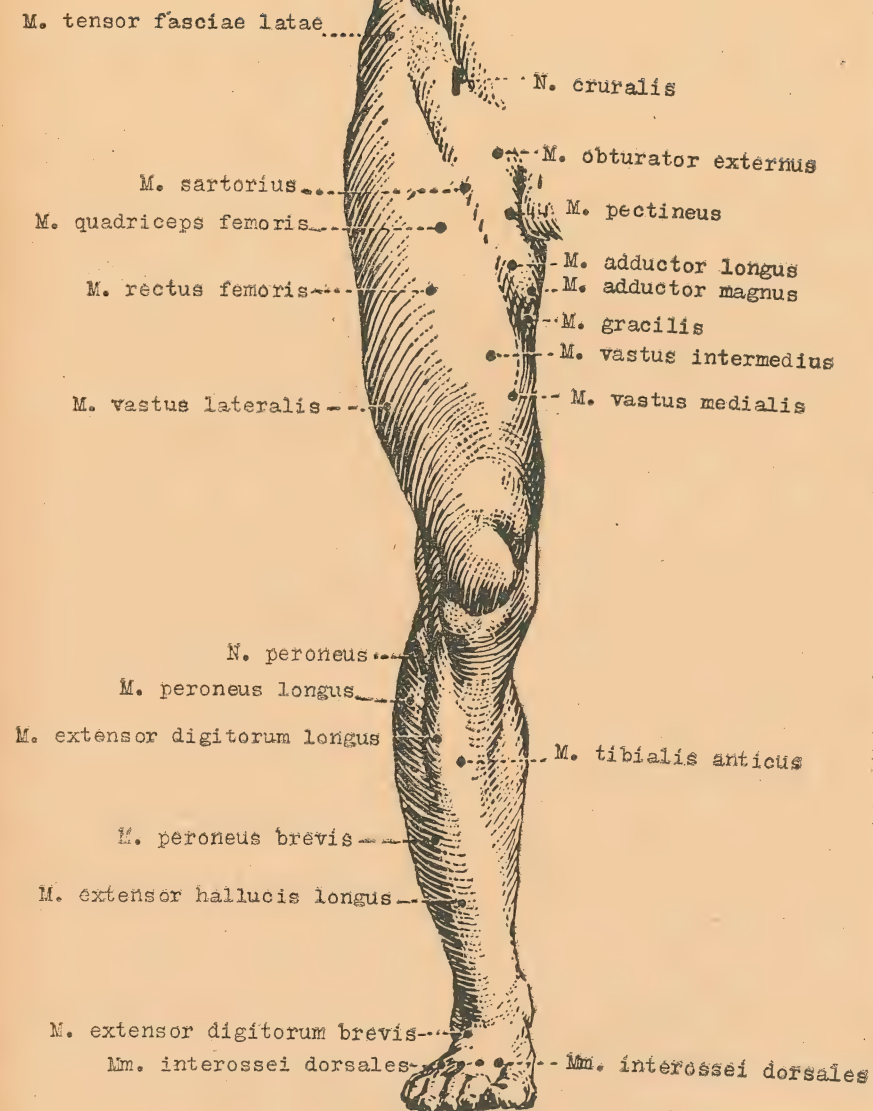
Cushioned applicator over the liver; firm pressure.

Daily for two weeks; then every second day for two or three weeks.

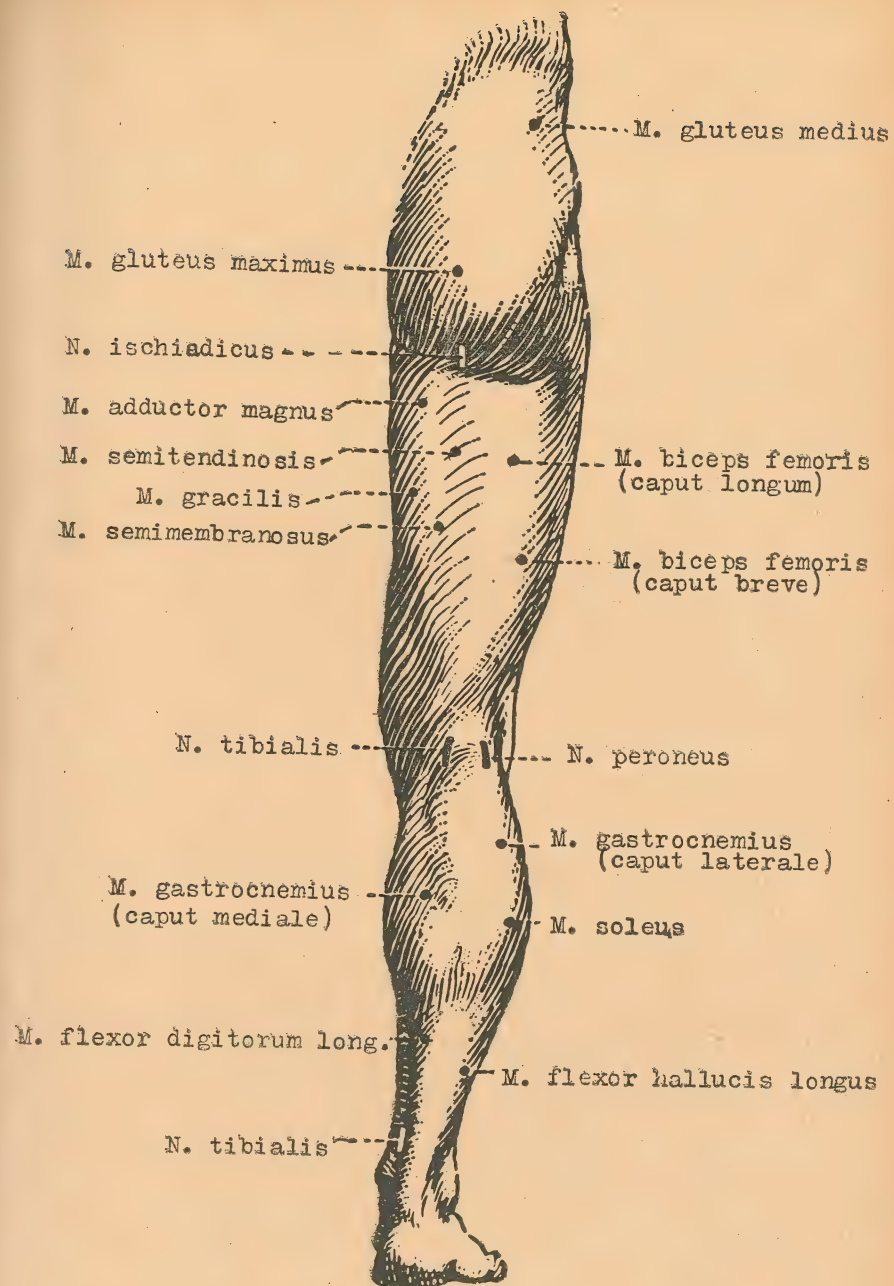
Rest a month, and repeat.

It is best that the vibration immediately follow the ultraviolet light.





Motor Points of Lower Extremity, Anterior Surface



Motor Points of the Lower Extremity, Posterior Surface



## CHOREA

(Most writers are non-committal as to whether physiotherapy is of real benefit).

**High Frequency:** Sharp, stimulating spark to spine, abdomen, and extremities, for a total of 15 minutes, daily or every other day.

**Ultraviolet Light:** Radiant Lamp, 20 minutes.  
Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.  
Daily; general.

**Vibration:** Vibrate over the spinal roots corresponding to the muscles involved, and at motor points along the trunks of the nerves to the muscles. Hard ball applicator, rapid, medium length stroke, medium pressure (for inhibitory effect).

## COAGULATION

See *Electro-Coagulation*.

## COCCYODYNIA

**Diathermy:** Through the rectum or vagina to painful area. Use mild current, 100 to 300 ma. Insulate the portion of the electrode that is in contact with the margins of the orifice, as here the heat is felt the most.

**Vibration:** Soft applicator over coccyx and lower part of sacrum; inhibitive effect by long stroke and deep pressure. Then, through the rectum over the internal surface of the coccyx. Daily to two or three times a week, till improvement takes place, or the operator is convinced that none is possible.

## COLITIS, MUCOUS

**High Frequency:** Vacuum tube, with current intensity capable of producing  $\frac{1}{2}$  to  $\frac{3}{4}$  inch spark, over bowel area, in contact or through underclothing; 15 minutes daily, till improvement is noted; then three times a week until relief is satisfactory.

**Diathermy:** One electrode on the abdomen over the large bowel, and the other in the rectum.

**Autocondensation:** To promote elimination, and as a sedative for the neurosis which usually accompanies the condition.

**Ultraviolet Light:** Radiant lamp, 30 minutes.  
Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.  
General: Mild reactions, daily to twice a week.

## CONJUNCTIVITIS

**High Frequency:** Vacuum eye electrode in contact with closed eyelid; current intensity adjusted so that the patient feels a moderate warmth.

## CONSTIPATION

**Surging Sinusoidal (Morse Wave):** The Morse Wave Generator with its Cam No. 4, is especially adapted to stimulating the bowel in a natural rhythm. Use a large pad on the back, about 6 by 3 inches, and one about 4 by 5 inches in the abdomen. It is best to give the treatment with three positions of the abdominal pad, the first in the right iliac area ("right lower quadrant"), the second in the lower epigastrium, and the third in the left iliac area. Begin with three to five minutes in each position, and increase to ten minutes or fifteen minutes in each. Current intensity should be as high as the patient will comfortably tolerate. Daily at first, and then increase the intervals, gradually tapering off the treatment.

For other form of sinusoidal apparatus, adjust the surges to about 10 or 12 per minute.

One pole may be used with the rectal electrode in the rectum.

**High Frequency:** Apply over the abdomen with glass vacuum electrode, lifting and lowering it in order to produce separate sparks, each one causing a jerk of the muscles. The lower the frequency, the more effective the treatment.

Diathermy will increase intestinal circulation and nutrition.

**Ultraviolet Light:** Radiant lamp, 20 minutes.  
Air-cooled,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.  
General exposure, three times a week.

**Vibration:**

1. Rapid, short stroke, medium pressure, on posterior nerve roots, from sixth dorsal to second sacral, 10 seconds each; the patient should be lying on the face and relaxed.

2. Then lay the patient on his back, flex the knees with heels to the buttocks (bladder should be empty); use a large flat applicator, or a "muscle roller," or a cushioned applicator, progressing in a clockwise direction over the large bowel. Do not vibrate too long in one place, as inhibition results.

3. (Especially in cases where the constipation is due to spasm or inhibition of the anal sphincter) vibrate within the rectum and sphincters, using Sim's position, and a lateral stroke of medium length; 20 to 40 seconds in the anus; three to five minutes in the rectum.



In general atonic conditions stimulate the vagus in the neck; just at the sides of the larynx, for 10 to 20 seconds.

Treatments should be given once or twice a day at the beginning, and gradually the intervals should be lengthened, and the treatment tapered off gradually, instead of being stopped suddenly.

## CONTRA-INDICATIONS

See under separate subjects:

High Frequency  
Diathermy  
Autocondensation  
Ultraviolet Light  
Vibration

## CORNS

Fulguration is recommended by some writers. This is not effective on the dead layers of tissue. It is painful, and difficult to apply; but it will give considerable relief if applied to the sore area around a corn. The action must be mild and superficial.

Ultraviolet Light: Water-cooled lamp,  $\frac{1}{2}$  to 2 minutes, contact; repeat when reaction begins to subside.

X-ray: (q. v.)

## CORYZA

High Frequency: Low-vacuum tube, with current intensity adjusted to produce a  $\frac{1}{2}$  inch spark, over the outside of the nose, supraorbital region, and sides of the face.

Intranasal electrode.

Ozone inhalation.

Ultraviolet Light: Water-cooled lamp, with etched-quartz electrode to disperse the rays within the nose. Protect the margins of the nares with vaseline, but be careful that the electrode is not smeared with it;  $\frac{1}{2}$  to 3 minutes. There will be a severe reaction following the treatment, which, however, will be followed by relief.

Galvanism: Wrap a piece of cotton on a metal applicator, moisten with a 1/5000 solution of adrenalin, insert in the nose, and use as the positive pole, with 5 to 10 ma. of current for 10 minutes; indifferent electrode held in the hand.

Vibration: Rapid, short stroke, firm pressure, first cervical to fifth dorsal spinal nerve roots. Then, the cushioned applicator, same



Illustration 14—Diathermy to both ankles, one cuff electrode about each ankle, soles of feet in salt solution.



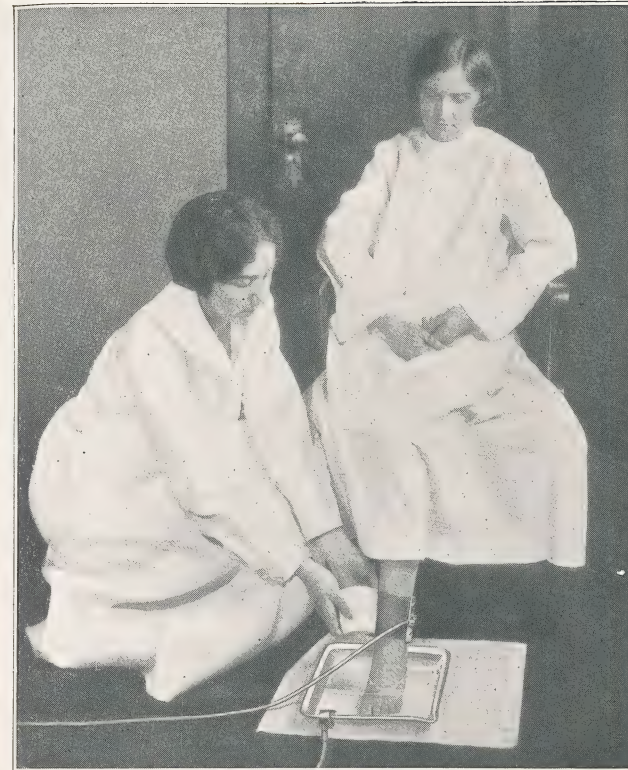


Illustration 15—Diathermy to one ankle, cuff electrode above, sole of foot in salt solution.



stroke, firm pressure, over the naso-frontal articulation, and the antrum of Highmore.

## CYSTITIS

High Frequency: With urethral and rectal electrodes; seven minutes daily. Vaginal electrode in women.

Diathermy over the bladder: 4 by 5 block-tin electrode over the bladder; 6 by 8 electrode under the sacrum. 1000 to 1500 ma.

Ultraviolet Light: Radiant lamp, 20 minutes.

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 10 inches.

Water-cooled lamp, 2 to 6 minutes, with special urethral, vaginal, or rectal applicators.

Local and general, twice a week.

Vibration: Ball applicator, rapid, short stroke, deep, firm pressure, from fifth lumbar to fifth sacral nerve roots; daily from 30 to 60 seconds.

Then, brush or rubber cup applicator, heavy pressure over the lower abdomen, perineum, and inguinal lymphatics; on the prostate through the rectum. Stimulation of the liver and spleen is of assistance.

## CYSTOCELE

Vibration: Stimulating technic to spinal centers from tenth dorsal to coccyx.

Stimulating technic intravaginally, with vaginal applicator.

Surging Sinusoidal (Morse Wave): Metal electrode wrapped with gauze or cotton saturated with one per cent sodium chloride, in the vagina; pad electrode over the bladder on the lower abdomen. Surges about ten per minute; modern current strength. Treatments beginning with five minutes, and extending to thirty, as vigor increases. Daily to three times a week.

## CYSTS

Drainage is necessary first of all. Then destroy the wall by fulguration.

Ultraviolet Light: Water-cooled lamp,  $\frac{1}{2}$  to 3 minutes, in contact, once a week.

## DANDRUFF

See *Seborrhea*.



## DEAFNESS, due to middle-ear inflammation

See also *Otitis Media*.

High Frequency, with special ear electrode. Caution: keep the current intensity very low; a fulgurating effect is readily obtained from the small, pointed end of the ear electrode.

Mechanical vibration, with ear masseur.

Vibration: Rapid, short stroke, medium pressure, on posterior spinal nerve roots, from third dorsal to first cervical, inclusive. Then cushioned applicator on mastoid process, firm pressure. Soft rubber cone or cup applicator over the external meatus. Ball applicator on anterior aspect of the neck along the upper border of the sterno-mastoid muscle, with intermittent pressure. Flat applicator or soft rubber cup on the point of the jaw, the latter being held rigid to transmit the stroke to its temporal articulation; long, slow stroke.

Radiant lamp on the side of the head.

Ultraviolet light on the side of the head.

## DEATH, TEST FOR

Cessation of the muscle response to faradic stimulation occurs in from 30 minutes to five hours after death, in the various muscles. A body that continues to respond to faradization is not dead.

## DERMATITIS HERPETIFORME

Ultraviolet Light: Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 20 to 10 inches. Three times a week, blistering moderately. Local and general.

## DERMATITIS VENENATA

Ultraviolet Light:

The first treatment at a distance of three feet; decrease 6 inches at each treatment, to a minimum of 18 inches.

The first treatment for 5 minutes, increasing  $2\frac{1}{2}$  minutes at each treatment, to a maximum of 15 minutes.

The first three treatments every second day; then twice a week.

## DIABETES

Autocondensation is widely recommended. The exact effect is not clear. We may be sure that it promotes elimination; there is some evidence that it lowers the metabolic rate, which is a desideratum in diabetes. The evidence that it increases sugar tolerance is not yet conclusive to the mind of the writer.

Diathermy through the pancreas is suggested, and seems logical, in cases where the diabetes depends rather on a lowered function, than on total destruction of the islands of Langerhans.

Most writers agree that ultraviolet light is contra-indicated in diabetes. Vibration, with the purpose of promoting blood and lymph circulation elimination, and the utilization of sugar in the tissues.

Ball applicator at the posterior angles of the ribs with rapid, medium length stroke; then stimulate the cervical sympathetics with deep pressure at the anterior border of the sterno-mastoids opposite the sixth cervical vertebra. Treat daily for two weeks, and then every second day as long as improvement is manifest.

## DIARRHEA

High Frequency: Tonic dosage over solar plexus, stomach and intestine, liver; and spinal nerve roots from sixth cervical to twelfth dorsal.

Vibration: Stimulating technic in same locations as above.

## DIATHERMY, MEDICAL

See also *High Frequency Discharge*.

Physiology:

The effects of diathermy are the results of the heating of the tissues by the passage of the current. These effects consist principally of relaxation of contractile tissue, which of course includes vaso-dilatation. The above fundamental effects produce the following secondary ones:

- Allaying of irritation
- Quieting of inflammatory pain
- Inhibition of fibrous tissue formation
- Absorption of fibrous tissue
- Stimulation of regeneration of nerve and muscle
- Stimulation of healing of bone
- Softening and removal of scar tissue and adhesions
- Stimulation of gland activity
- Promotion of elimination and removal of the products of fatigue and inflammation.



**Technic:**

Starting the treatment with a low current intensity and increasing gradually, will warm the tissues almost equally throughout between the electrodes, with the point of crossing of the dotted lines as indicated in the diagram, somewhat hotter than the remainder

Starting abruptly with a great volume of current, concentrates most of the heat at the surface, under the electrodes. This dries out the conducting material of the electrodes and the skin itself. The patient will complain of a prickling sensation and other discomfort.

Most writers on the subject agree that block-tin electrodes are the most satisfactory. Mesh electrodes are satisfactory; and for small, irregularly-shaped parts of the body, heavy tin-foil will be found useful. Electrodes should be moistened with soap solution or lather, to insure thorough contact and a softening of the skin such as is necessary for good conductivity. Wet pad electrodes, with salt solution, are not satisfactory for diathermy. The salt solution is not a good conductor for the high-frequency discharge; and during the course of the application, the heating produces evaporation, and a decrease in conductivity; either the volume of current delivered is thereby cut down, or burns result.

The heat travels in straight lines between the electrodes. If electrodes of unequal size are used, the greater concentration of heat will be at the smaller electrode, the degree depending on the ratio of the areas of the two electrodes.

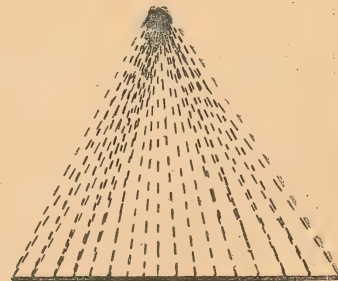
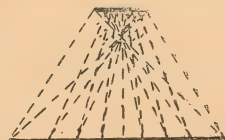
**DIATHERMY, MEDICAL**

Diagram illustrating the distribution of heat in relation to the proportional size of electrodes.

**DIATHERMY, SURGICAL**

The only way in which surgical diathermy differs from medical diathermy, is that a higher degree of heat is used, in order to de-



Illustration 14—Diathermy to both ankles, one cuff electrode about each ankle, soles of feet in salt solution.





Illustration 15—Diathermy to one ankle, cuff electrode above, sole of foot in salt solution.



stroy the tissue on which it acts. As a rule it is carried only to the extent of coagulating the tissue, and allowing it to slough off.

Two general methods are available:

1. The use of a large, indifferent electrode at a distant part of the body, and a small operating electrode. The destructive action is confined to a small area around the electrode.

If the maximum current is turned on abruptly, the coagulation will be only superficial; already coagulated tissue is a poor conductor.

If the current is brought gradually to a maximum, the coagulation will spread to a depth about equal to the diameter of the disc used as the active electrode. A greater depth of action will be secured by moistening the coagulated area with salt solution.

2. The use of two electrodes of equal size, the destructive action affecting the entire mass of tissue between them. In order to insure that the tissue is thoroughly coagulated, the current must be increased slowly, and brought to a maximum gradually.

The slough requires from one to three weeks to separate. The literature frequently warns against secondary hemorrhage, but reports of it are rare. It is the writer's opinion that if one does not permit the wound to become infected, there is no danger of secondary hemorrhage. The destructive action stops with the shutting off of the current, and all subsequent effect is inflammatory and healing in character.

Keep away from large blood vessels. The blood vessel wall may be destroyed, with a hemorrhage either immediately, or after the coagulated portion separates.

Avoid bone. Bone offers a high resistance to the passage of the current, and the periosteum is the first thing killed.

Edema follows, lasting for two or three days. Look out for the obstruction of vital lumina, as the larynx.

Contraction and adhesion are not common. Keloid may develop. Shock is rare.

The wound that is left by surgical diathermy is sterile; and only with gross neglect is there danger from infection.

The blood vessels and lymphatics are sealed, lessening likelihood of hemorrhage, the spreading of infection, or of metastasis in malignancy.

## DIATHERMY, CONTRA-INDICATIONS

### Medical:

Do not use where there has been hemorrhage, or where there is a possibility of one (tuberculosis, uterine disease, peptic ulcer, etc.) The unipolar applicator may be used in these cases.



Do not use within twenty-four hours of menstruation, nor in pregnancy.

Do not use where there is undrained suppuration, as pyemia may result: boils, abscesses, carbuncles, acutely infected joints, infected gall-bladder, poorly draining head sinuses.

#### Surgical:

- Avoid bone tissue.
- Avoid large blood vessels.
- Avoid using diathermy on undrained suppurating cavities.

## DIRECT CURRENT

See *Galvanism*.

## DIPHTHERIA

Ultraviolet Light: The membrane can be rendered sterile in two or three minutes by exposure to the water-cooled lamp.

## DUODENAL ULCER

Same technic as in *Gastric Ulcer* (q. v.)

## DYSENTERY

Ultraviolet Light:

- Radiant lamp, 30 minutes.
- Air-cooled lamp,  $\frac{1}{2}$  to 8 minutes; 20 to 10 inches.
- General exposure. Moderate reaction, daily.

## DYSMENORRHEA

See also

- Menstruation, Irregular
- Ovarian Disease
- Uterine Misplacement
- Prolapse
- Retroversion
- Anteversio
- Cervix, Stenosis of

Diathermy: Electrodes over the sacrum and the hypogastrium; current gradually increased to toleration and again gradually decreased to zero. One treatment usually relieves.

Ultraviolet Light: Radiant lamp 30 minutes.

Air-cooled,  $\frac{1}{2}$  to 3 minutes, 30 to 15 inches.

Daily for four days before the period.

Galvanism: Dilate and enter the os with the negative pole, as given under *Cervix, Stenosis of*. Then use faradic massage.

Vibration: Treat all tender spinal spots: rapid, short stroke, medium pressure; to relieve local tenderness.

During menstrual flow, vibrate from the eleventh dorsal to the third sacral; rapid, medium length stroke, firm pressure; to relieve local tenderness.

Between periods, the above technic will improve the function, and decrease the severity of attacks. Between periods use stimulating technic intravaginally.

## EARACHE

See *Otitis Media, Acute*.  
*Otitis Media, Chronic*.

## ECTOPIC PREGNANCY

Destroy the life of the fetus, and the mass will be readily absorbed.

Any sort of current may be used, galvanic, faradic, or sinusoidal; it is the shock that kills. Use the vaginal electrode placed closely against the mass, and all the current that the patient will stand. The indifferent electrode should be placed on the abdomen, directly over the mass.

## ECZEMA

High Frequency: Current intensity adjusted to produce a  $\frac{1}{4}$  to  $\frac{3}{4}$  inch spark; keep the electrode in contact with the surface, or apply through a thin layer of gauze.

To relieve itching, use a sharp spark, produced by quickly approaching and withdrawing the electrode.

Treat daily, for five or ten minutes.

Radiant Lamp: The writer has obtained better results from the use of small portable radiant lamps, with carbon-filaments and nitrogen-



filled bulbs, than from the large forms, with tungsten-filaments and blue-glass bulbs.

#### Ultraviolet Light:

Actinic rays increase the calcium metabolism, q. v.

For dry, scaly forms, use the same technic as for psoriasis, q. v

For weeping form, use sedative technic. This means the selection of the longer wave-lengths, accomplished by using the air-cooled lamp, at long distance (30 inches) and securing mild reactions frequently repeated.

Vibration: Soft rubber brush, rapid, short stroke, light to medium pressure. If tenderness and itching are very severe, contact must be light until relief is secured. Then vibrate over efferent lymphatics and lymph nodes. If the patch is wet or weeping, do not use on the sores, but on the surrounding tissue.

## ELECTRO-COAGULATION

Fulguration: The production of coagulation by means of the discharge from the unipolar, or Oudin terminal, through a metal electrode. The effect is superficial.

Surgical Diathermy (q. v.): The production of coagulation by means of the bipolar, or d'Arsonval current. Two classes of effects are possible:

1. With two small electrodes, equal in size and close together, there is a coagulation of the entire mass of tissue between them.
2. With a large indifferent electrode at a distant part of the body, and a small operating electrode, there is a coagulation for a varying distance surrounding the latter, depending on the current intensity.

The coagulation effect is produced solely by the heat produced by the passage of the electric current.

## EMPHYEMA

Physiotherapy will hasten recovery and healing, after surgical drainage has been obtained.

Diathermy.

Ultraviolet Light: Radiant lamp, 30 minutes.

Air-cooled lamp, 1 to 10 minutes, 20 to 10 inches.

Mild reactions daily.

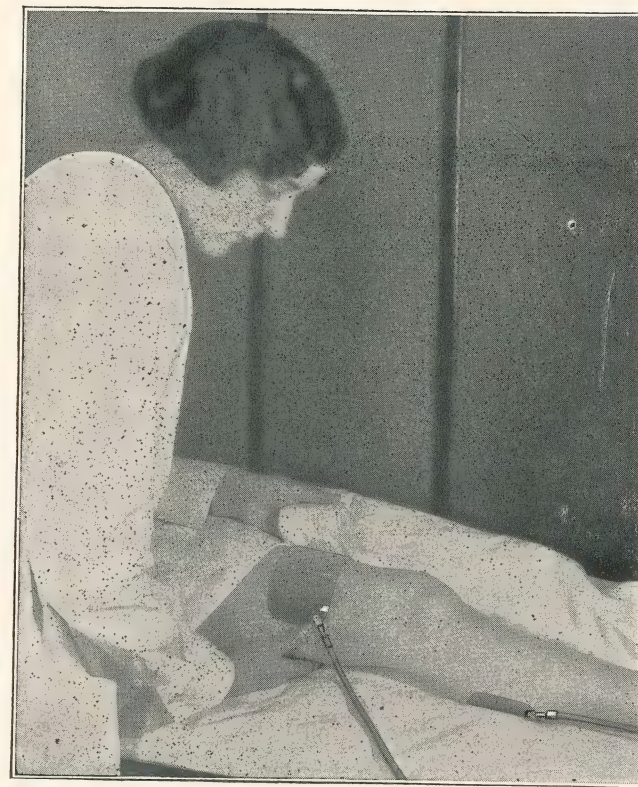


Illustration 18—Diathermy through knee, electrode above on anterior surface, electrode below on posterior surface.



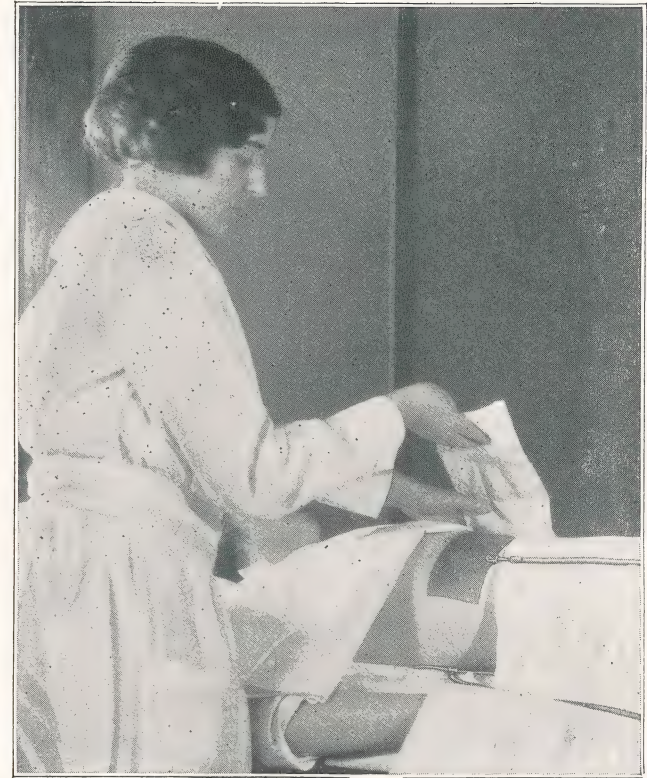


Illustration 19—Diathermy to hip, one electrode posterior, one anterior, held in place by sandbag.



## ENDARTERITIS OBLITERANS

See also, *Gangrene*.  
Radiant lamp.  
Diathermy.  
Infra-red.

In all of the above, the intensity must be mild, and the treatments long and frequent.

## ENDOMETRITIS

See also points in technic under *Cervix, Inflammation of*.

**Galvanism:** If preliminary dilatation of the os is required, proceed as under *Cervix, Stenosis of*. Use a copper electrode, as large as the uterine canal will admit, as the positive pole; negative pad on the abdomen. The copper electrode must be insulated along its entire length, except for the portion actually within the uterus. Begin with 6 ma. for 15 minutes, and work up to 12 ma. for 30 minutes. Copper will be carried into the mucous membrane, acting as an antiseptic and astringent; and the effects of the positive current cause a reduction in the boggy of the uterus, and an increase in tone. Treat every second to fourth day.

At the end of the treatment, the electrode will be found adherent to the mucous membrane in the uterus. It may be loosened by reversing the current, and allowing the intra-uterine electrode to act as the negative for a few moments.

Aseptic precautions are not required when the positive pole is used.

Diathermy: between the sacrum and the hypogastrium.

Ionization of Copper or Zinc: see *Galvanism*, above.

**Vibration:** Rapid, medium length stroke, medium pressure, eighth to eleventh dorsal and third to fifth lumbar, for a few seconds each. Cushioned applicator, rapid medium length stroke and deep pressure applied to a point one and one-half inches below the umbilicus and two inches out from the median line; patient on the back with knees flexed and heels to buttocks.

## ENURESIS, (Neurotic or "Idiopathic" Cases).

Autocondensation.

Ultraviolet Light: Radiant lamp, 20 minutes.

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches; daily to three times a week; general exposure; mild reaction.



## FAVUS

### Ultraviolet Light:

Air-cooled lamp, 1 to 5 minutes, 10 to 5 inches.

Water-cooled lamp,  $\frac{1}{2}$  to 5 minutes; 1 inch to contact. Secure a severe reaction, with blistering. Repeat when the reaction begins to subside.

## FELON

Diathermy: Heavy tinfoil cuff around the infected finger, kept in place with a bandage, and a layer of cotton between the bandage and the tinfoil, to distribute and equalize the pressure of the bandage. Do not bandage tightly for diathermy. The second cuff should be about ten times the area of the first, and may be put around the arm. Use mild intensity for prolonged periods.

Ultraviolet Light: Radiant lamp, 20 minutes.

Air-cooled lamp, 1 to 5 minutes, 10 to 5 inches.

Water-cooled lamp,  $\frac{1}{2}$  to 3 minutes, 1 inch.

Daily.

## FIBROIDS OF UTERUS

Galvanism: Various writers recommend prolonged treatment with the positive pole in the uterine canal, with a view to decreasing the nutrition of the tumor, and thereby causing it to atrophy. Accurate data are lacking in regard to the results of this treatment; but the theoretical conception is a good one; and it is desirable that more investigation be carried out along this line.

The method seems to be most successful on interstitial fibroids, and is not so useful in subperitoneal growths. Degenerating tumors cannot be so treated.

Use a copper rod, tapered toward the end, with a cervical curve, and insulated for the entire length except for the portion actually in the uterine canal. Use the largest size that the os will admit. This is the positive pole. The negative pole should be a large pad, on the abdomen. The current intensity should be as high as the patient's sensation will tolerate; 30 minutes, daily. Reverse the current for a few moments before removing the electrode from the uterus, to loosen adhesions.

*The method will readily control hemorrhage from fibroids.*

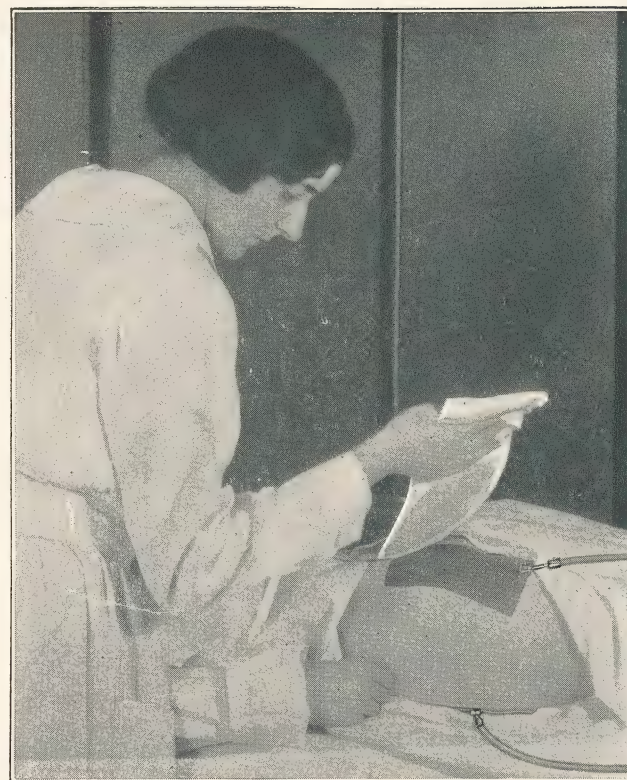


Illustration 20—Diathermy to hip, anterior electrode having the long axis parallel with the long axis of the body.





Illustration 21—Diathermy to temporomandibular joint, metal electrode held in place by nurse.



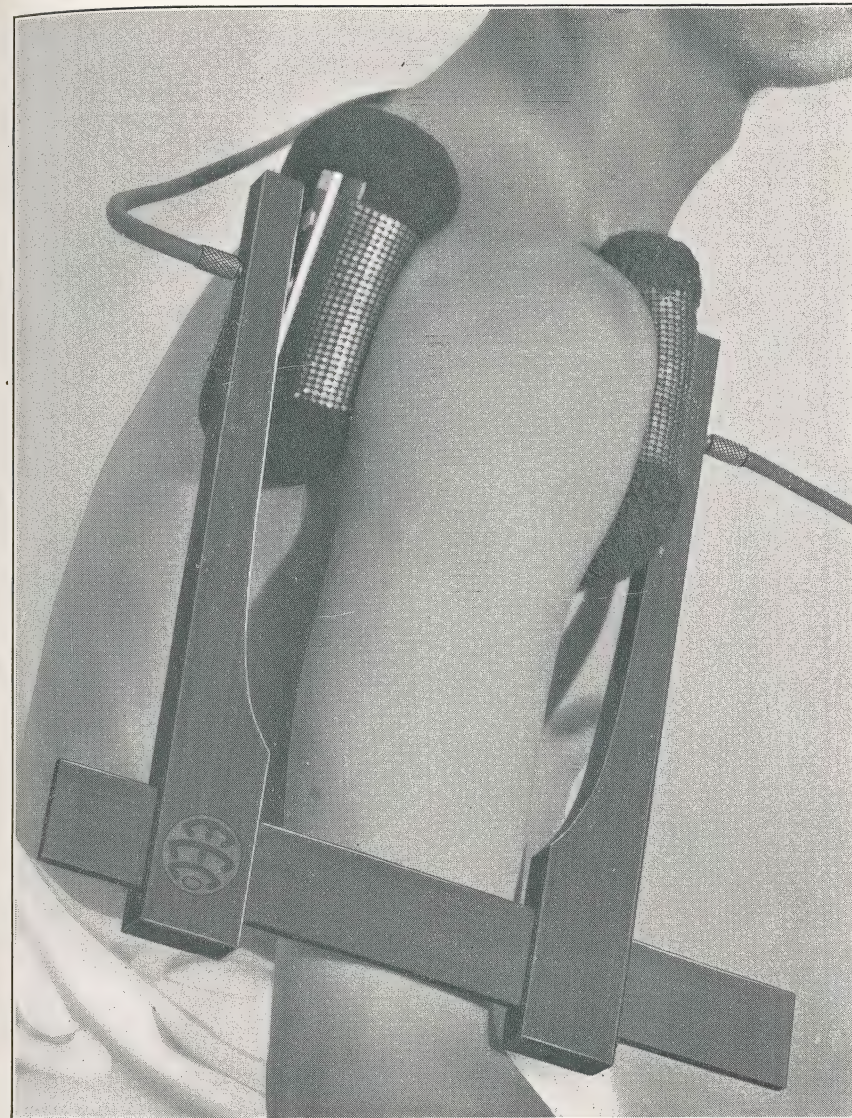


Illustration 22—Diathermy to shoulder, sponge electrode anterior and posterior, held in place by wooden clamp.



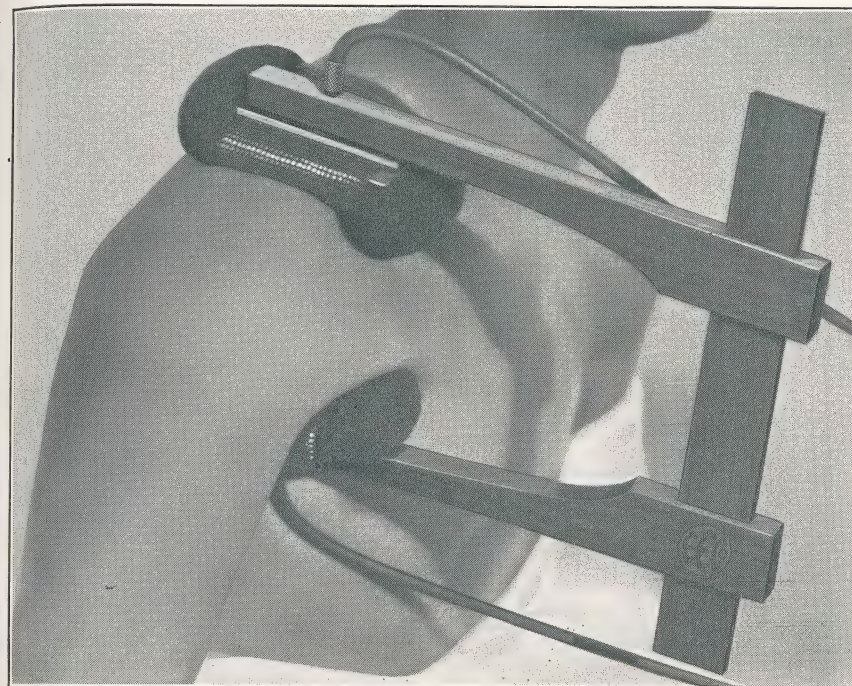


Illustration 23—Diathermy to shoulder, one sponge electrode in axilla, one above, held in place by wooden clamp.



## FIBROSIS

See *Scars*.

## FISSURE ANI

## FISTULA ANI

**High Frequency:** Rectal vacuum tube, inserted so that it just passes the sphincter; mild current intensity; 7 minutes, 3 to 6 times per week.

**Ionization:** Positive electrode of copper wire into the fissure or fistula (preceded by local anaesthetic if necessary); negative electrode at some indifferent point; 10 to 15 ma. for 10 minutes. Reverse the current for a few moments at the end of the treatment, to loosen the electrode. If all portions of the diseased mucous membrane are reached by the copper, one treatment will suffice. If not, repeat in four to six days.

Zinc will do as well as copper, and in some instances it seems to be even more useful.

## FLAT FEET

**A priori**, it is more desirable, when possible, to increase the tone and strength of the muscles that hold up the arch of the foot, than to support them, and thus constantly permit them to become weaker. In acute cases, temporary support is necessary.

**High Frequency:** Sharp, quick, individual sparks, along the sole, dorsum and inner side of the heel, and the inner length of the leg, of such intensity that each spark produces a perceptible jerk in the muscle. Daily for two to four weeks; 10 minutes each time.

**Surging Sinusoidal:** It is not necessary to find the motor point of each muscle and stimulate it separately. One electrode on the sole of the foot (the latter being well softened by soaking) and the other on the inner aspect of the leg just below the knee, will include all of the necessary muscles. Current intensity such as to produce moderate contractions; avoid excessive severity; 20 surges per minute, beginning with 5 minute periods, repeating daily, and increasing to 30 minutes very gradually.

Interrupted faradism can be used in exactly the same way as above.



## FRACTURES

**Diathermy:** In normal individuals, the healing time may be shortened one-third to one-half. Cases which otherwise refuse to heal, may be caused to do so by diathermy.

In cases where there is no danger of displacement, begin treatment at once. Remove the splints daily, and give diathermy through the fractured portion of the limb by means of cuffs above and below. In case setting has been difficult, and there is danger of malposition, wait a week or two and give the fragments a chance to knit; and then give treatments daily.

In general it is not wise to give diathermy without first removing the splint. Never include electrodes in a cast; the increase in size produced by the diathermy is apt to produce a disastrous ischemia. In favorable cases, where non-metallic splints are used, electrodes may be included, and diathermy given within the splint; but a very careful lookout must be kept so that the patient is not burned.

**Infrared:** Prolonged intensive treatment daily.

**Sinusoidal stimulation** to the muscles during the latter half of the treatment after the bones have become fairly well knit, will keep the muscles in shape, and give the patient the use of his limb earlier.

**Ultraviolet Light:** Especially useful in cases of non-union as it is a stimulant of calcium metabolism. General exposures.

## FURUNCULOSIS

**High Frequency:** mild sparks from vacuum tube, for 10 to 15 minutes, once or twice a day.

**Ultraviolet Light:** Radiant Lamp, 10 minutes.

Air-cooled,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.

Water-cooled,  $\frac{1}{4}$  to 3 minutes, 2 inches to contact.

Secure a severe reaction, with blistering. Repeat, if necessary, when the reaction has begun to subside.

## FULGURATION

Electrocoagulation produced by the unipolar or Oudin discharge with a metal electrode. Its action is limited and superficial. Milder degrees of the same discharge, less than what is required to produce coagulation, are stimulating and slightly analgesic.

Do not give a second treatment until the first one has healed.

## GALVANIC CURRENT, EFFECTS OF

### Positive Pole:

Astringent; contracts all contractible tissue elements.

Diminishes blood supply; blanches tissue.

Produces oxygen and acid reaction.

Metals and alkaloids are applied to the tissues by this pole.

Sedative and analgesic.

Stops bleeding.

Scar from burn is hard, dry, bleached.

Unfavorable to bacterial growth.

### Negative pole:

Softens, liquefies, disintegrates.

Increases blood supply; reddens, congests tissue.

Produces hydrogen and alkaline reaction.

Halogens and acid radicals applied to the tissues by this pole.

Irritating and stimulating.

Increases bleeding.

Scar from burn is soft, spongy, yielding.

Favorable to bacterial growth.

High voltage produces deep reaction and less skin disturbance.

The passage of the current heats the parts through which it passes; the action is not confined to the poles.

Mild currents invigorate; strong currents depress living tissue.

Too strong a current and too prolonged application does harm.

Do not turn currents on and off suddenly, in treating patients.

When the negative pole is the active electrode, use aseptic technic.

## GALVANIC CURRENT; CONTRA-INDICATIONS

Keep away from the heart with it, to avoid producing fibrillation.



## GANGRENE

See also *Endarteritis Obliterans*.

Ultraviolet Light: Radiant Lamp, 30 minutes.

Air-cooled lamp, 1 to 5 min.; 20 to 10 inches.

Water-cooled lamp,  $\frac{1}{2}$  to 3 minutes, 2 inches.

Stimulate heavily, daily. Local and general.

Diathermy.

## GASTRALGIA (Epigastric pain due to increased tone of the smooth-muscle of the gastro-intestinal tract.)

Vibration: Rapid, short stroke, deep pressure on second and ninth dorsal vertebrae on the left side of the spine. Also, vibrate the vagus nerve as given on the technic for *Gastric Ulcer*.

Then, short, rapid, rotary stroke over the posterior angles of the left ribs and over the stomach in front, with moderately deep pressure, and increasing speed up to its highest point.

Autocondensation: Gastralgia is often a symptom of "nervous tension" or of excessive sympathetic stimulation, which is relieved by autocondensation.

## GASTRIC ULCER

Ultraviolet Light: At the present time, the value of the preliminary treatment with the radiant lamp is being questioned.

Air-cooled lamp, 1 to 10 minutes, 20 to 10 inches. Tan the skin of the entire body thoroughly, by means of mild reactions, frequently repeated.

Vibration: Hard applicator, rapid, short stroke, medium pressure over the second dorsal to fifth dorsal spinal nerve-roots. Then, stimulate the vagus nerve with the hard applicator by means of interrupted vibration at the anterior edge of the sterno-mastoid where it crosses the omo-hyoid, just above the sternum; one second off and one second on.

Autocondensation: the same remarks apply here, as given for this modality under *Gastralgia*.

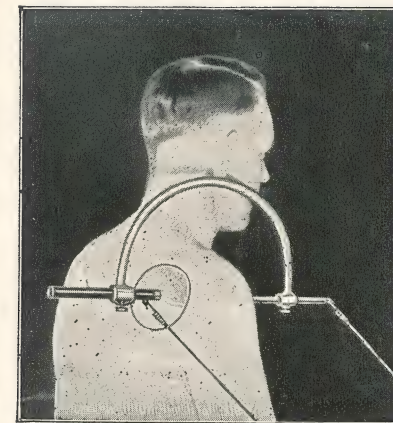


Illustration 24—Diathermy to shoulder, one metal electrode anterior, one posterior, held in place by spring clamp.



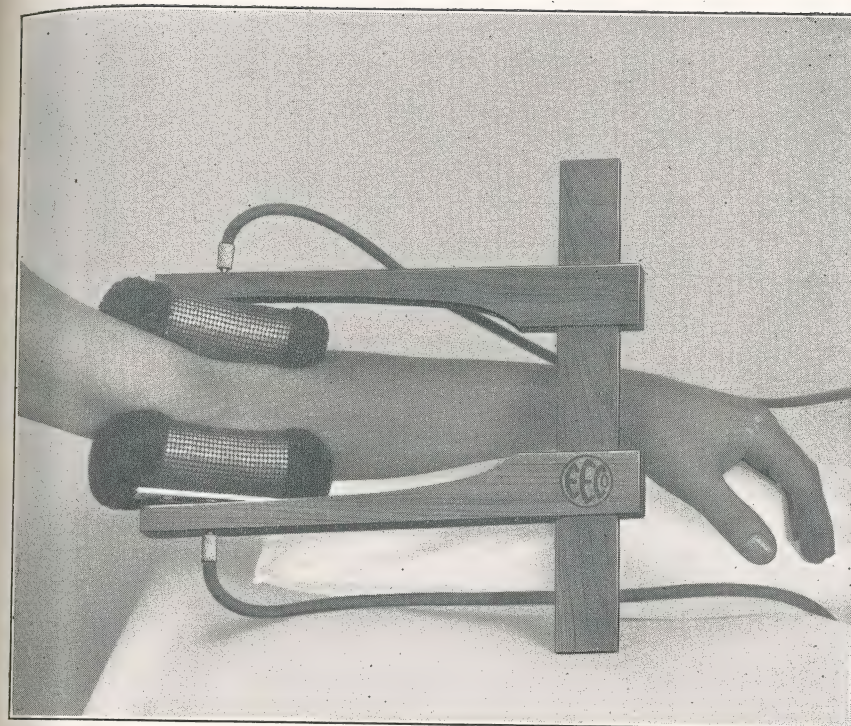
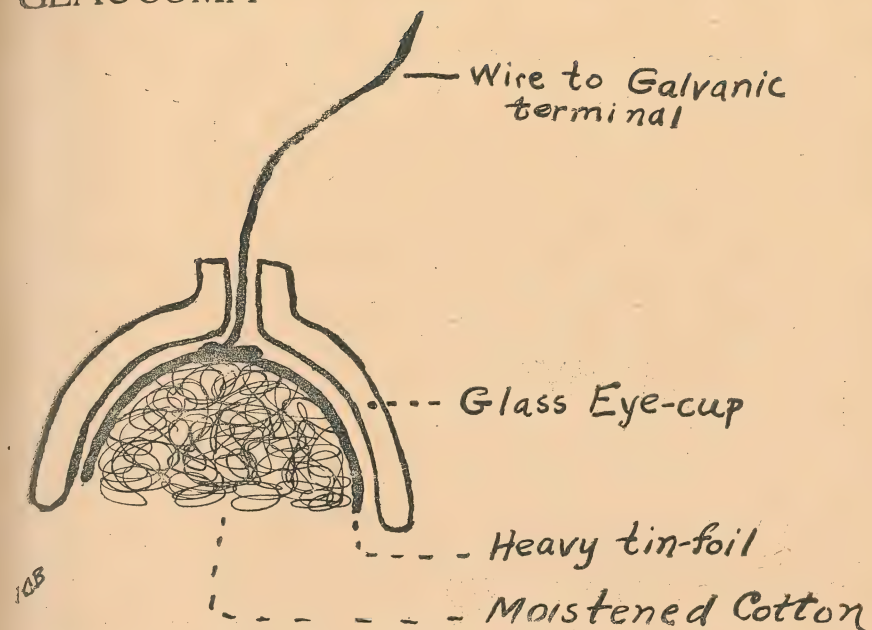


Illustration 25—Diathermy to elbow, sponge electrode on either side, held in place by wooden clamp.



## GLAUCOMA



Treat the underlying hypertension, see *Hypertension*.

High frequency with the eye-electrode, through the eyelids.

Negative Galvanism: Apply by means of a gauze pad moistened with 1 per cent salt solution, the connection being by means of a lead or tin foil laid upon the gauze. Or a special eye electrode may be used, as shown in the illustration. Adjust current gradually to toleration, and treat for 10 minutes, daily.

Vibration: Stimulating technic to third cervical vertebra.

## GLEET

See *Urethritis, Chronic*.

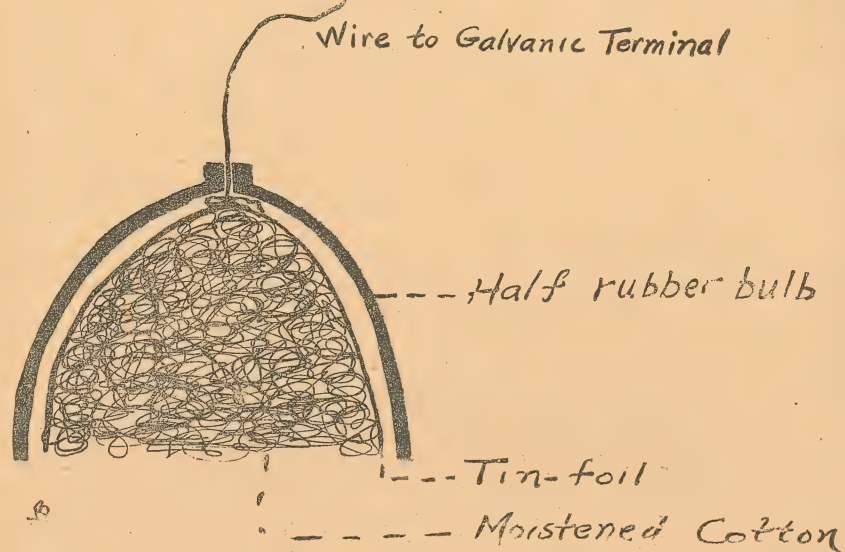
## GOITER, CYSTIC

Most writers agree that this condition cannot be benefited by physiotherapy.

Eberhart recommends high frequency,  $\frac{1}{2}$  to  $\frac{3}{4}$  inch spark intensity, in contact with the skin, for 5 minutes, followed by 2 or 3 minutes of sharp spark.



## GOITER, EXOPHTHALMIC



Cataphoresis of thiosinamin, with the positive pole. For an electrode, cut a rubber bulb in half, and line it with heavy tinfoil or block tin, and fill with cotton saturated with the thiosinamin solution. Give 12 to 20 ma. for 10 minutes, 3 times a week. Solution as follows:

Thiosinamin .....	20 grains
Sodium chloride .....	5 grains
Glycerin .....	2 ounces
Water to make .....	6 ounces

Galvanism: The negative pad in front, covering the goiter; the positive pole on the back between the shoulders. 70 to 80 ma. for 30 minutes daily, at intervals of 3 days.

## Ultraviolet Light:

Air-cooled lamp, 2 to 5 minutes, 15 to 5 inches.  
Water-cooled,  $\frac{1}{2}$  to 3 minutes, 1 inch.  
Locally twice a week; moderate reactions.

Vibration: 1. Treat the whole spine with special attention to inhibiting sensitive areas.

2. Treat the goiter and the glands for *Simple Parenchymatous Goiter*.
3. Vibrate between the shoulder-blades, to lessen the tachycardia.
4. Stimulate the liver and spleen.

Autocondensation: There is some evidence to indicate that autocondensation decreases the metabolic rate.

X-ray: q. v.

## GOITER, SIMPLE PARENCHYMATOUS

Cataphoresis of iodine from the negative pole. See instructions for preparing electrode under *Cataphoresis in Goiter, Exophthalmic*. Place the positive pad under the back, between the shoulders. Raise the current gradually to 20 ma., and continue for 10 minutes. Repeat as often as the irritation to the skin will permit. The electrolyte should be a 10 per cent solution of potassium iodide.

Galvanism: Same technic as under *Goiter, Exophthalmic*.

X-ray, q. v.

## GONORRHEA, ACUTE

Radiant lamp, for several hours each day.

Infrared: It is wiser not to introduce the orificial applicators in the acute stage. Use the flat applicators, and radiate exteriorly; prolonged, intensive.

## Ultraviolet Light:

Special intra-urethral electrode with etched surface, in order to scatter the rays laterally. Air-cooled,  $\frac{1}{10}$  minutes, or water-cooled,  $\frac{1}{4}$  to 5 minutes.

## GONORRHEA, CHRONIC

See *Urethritis, Chronic*.

*Prostatitis, Chronic*.

Diathermy: For prostate and seminal vesicles: electrodes in rectum and over the pubis.

Surging Sinusoidal: Special electrode with flattened surface to fit over the prostate, through the rectum, 20 to 40 surges per minute, for 5 to 10 minutes; every second to fourth day.

Ultraviolet Light: Rectal applicator; moderate reaction. In stubborn cases, give an overdose, to secure a violent reaction.

## GOUT

This is in reality a rare disease in this day and country.

Autocondensation, to promote elimination.

Radiant lamp on the lesions.

High Frequency after the acute stage has subsided.

Ultraviolet Light: Radiant lamp 30 minutes. Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes; 30 to 15 inches. Water-cooled lamp,  $\frac{1}{4}$  to 3 minutes, 2 inches. Daily, local and general.



## GRAY HAIR

Eberhart's High Frequency Manual contains the statement that the high frequency current can restore color to gray hair; the treatment must be continued for many months.

## HAY FEVER

**High Frequency:** Have the mucous membrane of the nose clean. Use the nasal electrode, and cover all accessible nasal mucosa, first with a fine effleuve, and then with hotter sparks; 10 minutes to each side of the nose. Irritable individuals may be cocainized.

**Ultraviolet Light:** Water-cooled lamp, with nasal applicator, whose surface is etched so that it will scatter the rays laterally. Or, if such an applicator is not available, touch a number of spots, one minute to each spot.

Also expose the posterior nares and nasopharynx, by means of a special applicator.

General exposure with the air-cooled lamp, to stimulate the calcium metabolism, q. v.

## HEADACHE

See *Migraine*.

*Cerebral Anemia.*

*Cerebral Hyperemia.*

These methods apply mainly to nervous and congestive headaches.

**Galvanism:** Positive pad over occiput; negative over the solar plexus, back, or ankles; 3 ma. for 10 or 15 minutes.

**High Frequency:**  $\frac{1}{2}$  to  $\frac{3}{4}$  inch spark intensity; vacuum tube electrode, in loose contact, over forehead and occiput, 5 to 10 minutes.

Vibration will cure any headache; but if it is due to organic disease, the relief will last only a short time. Even a headache due to a purulent sinusitis may be relieved for a half an hour by vibration. Congestive and neurotic headaches yield readily. Use the inhibitive technic on the forehead and occipito-nuchal region; and if need be, along the spinal nerve-roots, for the entire length of the spine.

## HEART DISEASE

See *Myocarditis*.

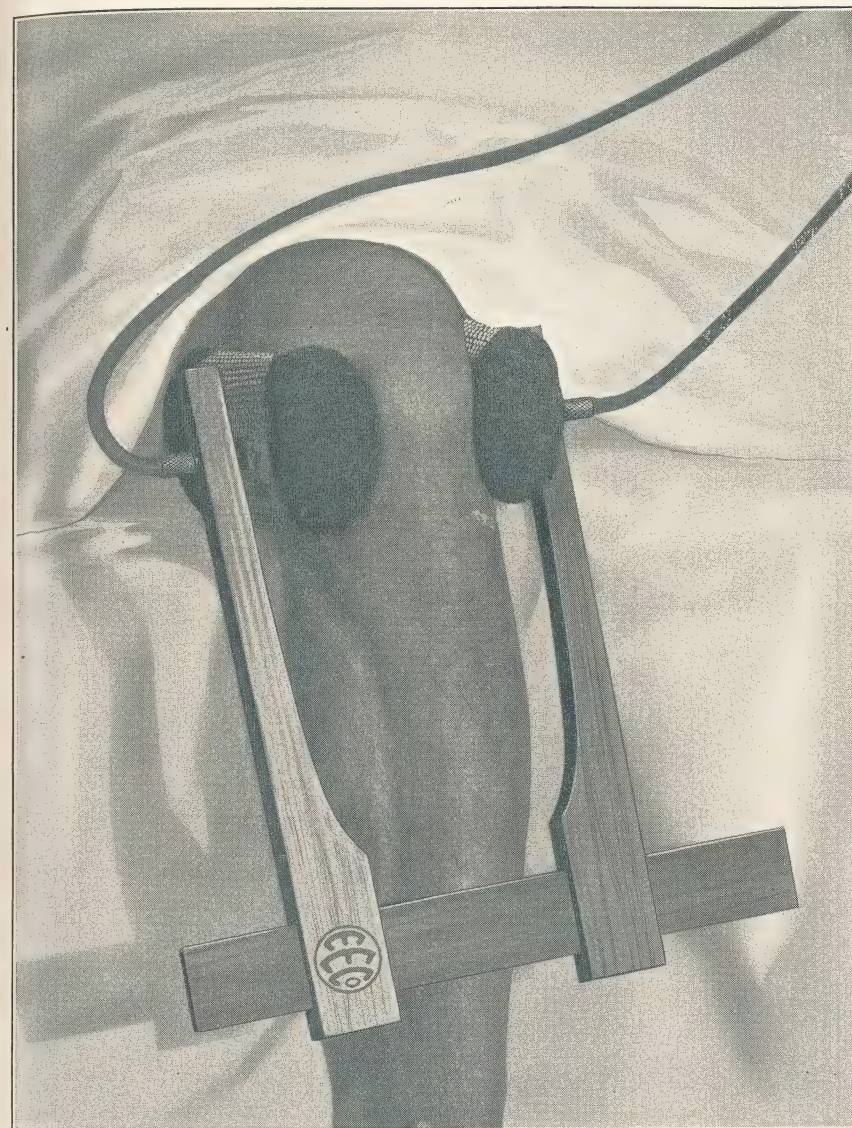


Illustration 26—Diathermy to knee, sponge electrode on each side, held in place by wooden clamp.



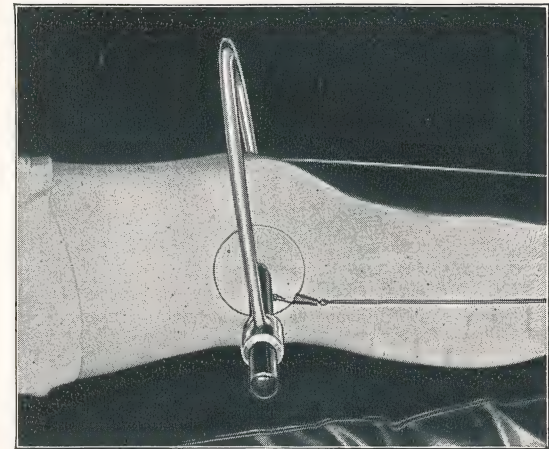


Illustration 27—Diathermy to knee, metal electrode on each side held in place by spring clamp.

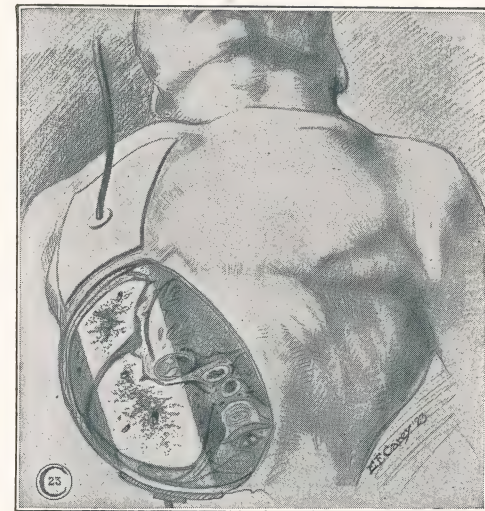


Illustration 28—Schematic drawing showing action of diathermia on pneumonic lung. One electrode anterior, one posterior.



## HEMANGIOMA

Ultraviolet Light: Air-cooled lamp,  $\frac{1}{2}$  to 10 minutes. 20 to 10 inches.  
Water-cooled lamp.  $\frac{1}{4}$  to 5 minutes. 2 inches. Severe reactions;  
repeat when the previous reaction has begun to subside.

## HEMORRHOIDS

This is very frequently a temporary condition, relieved by general building-up treatment.

### Palliative:

Galvanism: Copper rectal electrode, positive pole; negative pad on abdomen, 6 by 8 inches; 8 ma. for 10 minutes. Turn the current up to the maximum, and down again, very gradually. Reverse the current for a few moments before removing the electrode.

High Frequency: Non-insulated electrode, mild current intensity, for not exceeding seven minutes.

Ultraviolet Light: Rectal applicator, in contact: Air-cooled lamp, 1 to 5 minutes; water-cooled lamp, 1 to 3 minutes; blister lightly twice a week.

Diathermy, Medical: Sim's position; indifferent electrode on the sacrum abdomen, or hip. The insulated portion of the rectal electrode must be at the sphincter; 800 to 1500 ma. for 10 minutes daily. Allow the electrode to cool before withdrawing.

Vibration: 1. Heavy stimulation of lumbar and sacral centers, ball vibratode, long stroke, 1 minute.

2. Stimulate the liver (5th to 9th dorsal), and the right side over the intercostal spaces.

3. Rectal applicator, rapid, short, lateral strokes over the rectum. If there is no protrusion 20 or 30 seconds; if the hemorrhoids protrude, 1 and  $\frac{1}{2}$  to 2 minutes over the tumors, and finally within the rectum.

Treat the causative condition, and refer to *Constipation, Anemia, Tuberculosis*.

### Radical:

Electrocautery

Fulguration

Surgical Diathermy



## HERPES PROGENITALIS

### Ultraviolet Light:

Air-cooled lamp, 1 to 5 minutes, 20 to 10 inches.

Water-cooled lamp,  $\frac{1}{4}$  to 3 minutes, 2 inches.

Severe reaction; repeat when it begins to subside.

## HERPES ZOSTER

High Frequency:  $\frac{1}{4}$  to  $\frac{3}{4}$  spark intensity, loose contact, or through layer of gauze; treat daily for 10 or 15 minutes. Usually, two to four treatments suffice. Treat the nerve supply to the area of eruption.

Ultraviolet Light: Radiant lamp, 20 minutes.

Air-cooled lamp, 2 to 10 minutes, 10 to 5 inches.

Water-cooled lamp, 1 to 3 minutes; 1 inch to contact.

Blister heavily, and repeat when the reaction begins to subside.

Vibration, to relieve pain and itching:

1. Deep inhibitive vibration with ball vibrator, over sensitive spinal centers, and the posterior roots of the involved nerves.

2. Short lateral strokes increasing from medium to highest speed, over the diseased area, with soft rubber applicator, two or three minutes over each spot, or until peripheral inhibition has been accomplished.

## HIGH FREQUENCY DISCHARGE, With Vacuum Electrode

### General Effects:

Increased local metabolism and phagocytosis.

Local stimulation; precise effect depending on spot stimulated.  
Increased secretion of sweat or other glands.

Stimulation of nerve cells; i. e. posterior nerve-roots, when applied to the spine, and resulting in visceral stimulation.

Preliminary vaso-constriction; then, vaso-dilatation, and hyperemia; increased nutrition and elimination.

Partial local analgesia.

Repeated applications tan the skin.

Prolonged action of heavy sparks destroys hair-follicles and produces coagulation of tissue protein, and necrosis.

*Vacuum Tubes Do Not Administer Ultraviolet Rays to the Patient. There is no Such Thing in Physiotherapy as a "Violet Ray."*

### General Technic:

The strength of dosage is estimated by the length of the spark that is produced as the vacuum electrode is approached to the surface of the body.

A layer of gauze over the treated part will permit of a short spark, which produces hyperemia and bathes the part in ozone.

The unipolar connection, to the Oudin terminal, is the usual one. The same result may be achieved by connecting the patient to one of the d'Arsonval terminals, and the electrode to the other.

To charge the patient's body, put him on an insulated platform.

## HIGH FREQUENCY DISCHARGE, CONTRA-INDICATIONS

Do not use vacuum electrode over an aneurysm, nor over undrained suppuration.

## HYPEREMESIS GRAVIDARUM

Sedative treatment to the vagus nerve, in the neck, anterior to the sterno-mastoid muscle, at the level of the larynx. This may consist of:

Faradism.

Vibration.

Galvanism, positive.

Faradism or vibration gives the quickest relief, while the results of galvanism are more lasting.

## HYPERTENSION, FUNCTIONAL STAGE

Autocondensation Daily. Less than three treatments per week are useless. As the blood pressure approaches normal, the treatments may be further apart, just sufficient to maintain the good results.

Ultraviolet Light: Radiant lamp, 30 minutes.

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.  
Daily to twice a week; moderate reaction, general.

## HYPERTENSION, ORGANIC STAGE

### Autocondensation:

Do not use in cases of low systolic and high diastolic blood pressure.



Watch the patient; stop when the veins of the wrist begin to dilate, or when the patient begins to perspire.

Do not turn on a large volume of current suddenly. Start with 300 ma., and increase gradually by opening the spark-gap rather than by increasing voltage.

Ultraviolet Light, to increase general vitality:

Radiant lamp, 30 minutes.

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches.

Three times a week; moderate reaction; general exposure.

## HYPERTRICHOSIS

Galvanism: Positive electrode held in the hand, or applied as a pad to an indifferent part of the body. A bulbous, pointed steel needle is then inserted into the hair-follicle to a distance of  $\frac{1}{8}$  inch, and about one milliamperes of current used. As soon as a bubble of gas appears, the hair will loosen, and can be readily pulled out. The treatment is followed by an inflammatory reaction; so that it is best not to remove too many at one sitting.

## HYPOTENSION

High Frequency: Sharp, stimulating sparks to the whole length of the spine, and over the solar plexus.

Vibration: Stimulating technic to the same region.

Diathermy: For cases with subnormal temperature, depression, and decreased metabolism, use hand-to-foot diathermy; hand electrode as for autocondensation, and block-tin electrodes to the soles of the feet connected with a bifurcated cord; 500 to 800 ma. daily for 15 to 30 minutes. Begin with low current intensity and increase gradually.

## HYSTERIA

Technic as given under *Neurasthenia* can be used here.

Ultraviolet Light:

Radiant lamp, 20 minutes.

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 20 to 10 inches.

Use sedative technic (long wave-length): long distance, short and frequent exposures, mild reaction. Daily, general exposure of whole body.

High Frequency: Sharp sparks all over the spine.

Autocondensation: Not over 600 or 700 ma. for 30 minutes.



Illustration 29—Diathermy to middle ear, one electrode in the ear on upper side, the face resting upon the indifferent electrode on the opposite side.

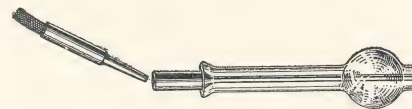


Illustration 30—Drawing showing construction of special electrode for applying diathermy to middle ear.





Illustration 31—Photograph showing the Linn biaural electrodes for applying diathermy to the middle ear.



Vibration: General spinal treatment with ball applicator and deep pressure, regulating the length of treatment as required.

Lateral stroke with rubber brush over anesthetic areas.

## ICHTHYOSIS

### Ultraviolet Light:

Radiant lamp, 30 minutes.

Water-cooled lamp, 1 to 5 minutes, 1 inch.

Air-cooled lamp, 1 to 10 minutes, 15 to 10 inches.

Blister heavily, and repeat when reaction begins to subside.

## IMPETIGO

High Frequency: For details of technic, see *Acne Vulgaris*.

### Ultraviolet Light:

Radiant lamp, 10 minutes.

Air-cooled lamp,  $\frac{1}{2}$  to 10 minutes, 15 to 5 inches.

Water-cooled lamp,  $\frac{1}{4}$  to 3 minutes, 2 inches.

Blister heavily; repeat when reaction begins to subside.

Local and general.

## IMPOTENCE, FUNCTIONAL

Diathermy, between rectum and pubis.

Vibration: 1. Deep stimulation to spinal centers from tenth dorsal to coccyx with ball vibrator and long stroke, medium speed, 6 to 8 seconds over each center.

2. Short lateral stroke with salt rubber brush to inguinal region, to base and dorsal surface of penis, and to perineum.

Treat daily at first, and then every other day.

## INDIRECT DIATHERMY



## IONIZATION

See also *Cataphoresis*.

The introduction of the ions of an electrolyte into the tissues by means of the galvanic current. The penetration is at most but a few millimeters.

Cleanse the skin thoroughly with soap and hot water, followed by alcohol and ether. Use a large pad soaked in the electrolyte for the active pole. The indifferent pole should be a large pad moistened with 1 per cent salt solution, on some other portion of the body. Cover all abrasions and pimples with collodion. Heating the parts first with the radiant lamp, diathermy, or the high frequency discharge, will enhance the effect. The current should be as strong as the patient will tolerate, 40 to 80 ma. for a long time.

Substances introduced with the negative pole:

Halogens: iodine, bromine, chlorine.

Salicylic acid.

Acid radicals.

Substances introduced with the positive pole.

Metals.

Morphine, cocaine, adrenalin.

Alkaloidal radicals.

Thiosinamin.

## Isotonic Solutions.

A

Zinc sulphate 75 grains

Glycerin, 2 ounces

Water 35 ounces

Dilute one-half for use.

B

Sodium salicylate 175 grains

Water 1 pint

Dilute one-half for use.

C

Sodium chloride 175 grains

(Or Potassium iodine)

Water 1 pint

Dilute one-half for use.

## IRITIS, CHRONIC

High Frequency: Eye technic as given under *Cataract*.

Galvanism, as given under *Cataract*.

Infrared light.

## KELOID

Ionization (q. v.) of thiosinamin. Technic given in detail under *Scars*.

Ultraviolet Light:

Air-cooled lamp, 5 to 10 minutes; 5 inches to compression.

Water-cooled lamp, 1 to 5 minutes; compression.

Blister heavily; repeat when reaction begins to subside.

## KERATITIS

High Frequency.

Negative galvanism.

Same technic as under *Cataract*.

## LARYNGITIS

High Frequency: Vacuum electrode externally five minutes.

Diathermy

Ozone inhalation

Electrically heated spray, for inhalation of heated vapor, preferably of some of the stimulating oils. The following is commonly used:

Camphor—1 dram

Menthol—1 dram

Oil Pine Needles—1 dram

Encalpytol—1 dram

Liquid petroleum to 4 ounces.

Ultraviolet Light:

*Acute*: Radiant lamp 30 minutes; air-cooled lamp  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches; do not blister; local and general.

*Chronic*: Radiant lamp 30 minutes; air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 10 to 5 inches; water-cooled lamp,  $\frac{1}{4}$  to 1 minutes, 2 inches; blister lightly, local and general.

Vibration: Use the same technic as given under *Tonsillitis*.

## LATERAL SCLEROSIS

The same technic is applicable as is given under *Tabes Dorsalis*.

## LEUKORRHEA

See also *Endometritis*; *Cervix, Inflammation of*.

High Frequency, vaginal electrode; the frequency of the treatments de-



depends on the acuteness of the case; more frequent in acute cases. Use in connection with antiseptic or astringent douches.

Tonic sparks to lumbar and sacral spine.

Ultraviolet Light: Air-cooled lamp, 2 to 8 minutes, with vaginal applicator; water-cooled lamp, 2 to 5 minutes, with vaginal applicator. Three times a week.

Vibration: Rapid, medium length stroke, medium pressure, on eighth dorsal to fourth sacral spinal nerve roots.

Vibrate the deep lumbar lymph nodes with the small hard applicator, rapid, medium length stroke, very deep pressure; one and one-half inches below the umbilicus and two inches out from the median line; patient lying on the back with knees drawn up, heels to buttocks.

Vibrate the uterus directly with uterine applicator, or per rectum.

Daily to weekly.

## LEUKEMIA, MYELOGENOUS

Ultraviolet Light: Radiant lamp 20 minutes; air-cooled lamp  $\frac{1}{2}$  to 5 minutes, 20 to 10 inches; moderate reactions. General exposure.

Autocondensation.

Diathermy of long bones.

X-ray, q. v.

## LOCOMOTOR ATAXIA

See *Tabes Dorsalis*.

## LUMBAGO (Lumbar neuritis)

Galvanism: Positive pad electrode over painful area; negative pad of larger size over the abdomen; 10 ma. for 10 minutes.

High Frequency: Sharp sparks over painful areas, with muscles held on a stretch.

Diathermy: Block-tin electrode over painful area about one-fourth the size of indifferent electrode over the abdomen; 100 ma. per square inch of surface of the smaller plate.

Local autocondensation; see *Autocondensation*, *Local*.

Radiant Lamp.

Ultraviolet Light: Radiant lamp, 30 minutes. Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 10 to 5 inches. Water-cooled lamp,  $\frac{1}{4}$  to 1 minute, 1 inch. Moderate reaction, daily. Local and general.

Vibration: From 1 to 5 treatments are usually sufficient.

1. Deep pressure, long percussion stroke, deep inhibitive vibration to dorsal and lumbar centers.

2. With soft ball or brush vibratode, vibrate all lumbar muscles, using lateral stroke, high speed, and long application, until all pain is relieved. If areas are very sensitive, begin with light pressure, and increase as tolerance increases.

## LUPUS VULGARIS

Fulguration: In early stages, when there are only a few small nodules.

Carbon Dioxide Snow: About 1 minute's pressure, repeating when reaction has subsided.

Ultraviolet Light: Radiant lamp 20 minutes; air-cooled lamp 2 to 10 minutes, 10 to 5 inches; water-cooled lamp, 1 to 5 minutes, 1 inch. Repeat when reaction has begun to subside. Blister heavily. Local and general.

## LYMPHANGITIS

Ultraviolet Light: Radiant lamp, 1 hour; air-cooled lamp, 1 to 10 minutes, 10 to 2 inches; water-cooled lamp  $\frac{1}{2}$  to 3 minutes, 2 inches; twice daily; local and general.

Diathermy: Moderate intensity, and long time; 600 ma. for 1 hour,

Infrared: Mild prolonged.

## LYMPH NODES, INFLAMED OR ENLARGED

See *Adenitis*.

## MALNUTRITION

Ultraviolet Light: Radiant lamp 20 minutes. The value of the radiant lamp as a preliminary to the ultraviolet is questioned at this time, in general treatment for the entire body.

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes; 30 to 15 inches; mild reactions 3 times a week; general.

## MELANCHOLIA

Vibration: Sensitive spots in the spine are nearly always present, and should receive inhibitory vibration.



1. If too sensitive, the brush may be used at first, with light pressure, and followed by the ball vibratode with short stroke and light pressure, both being gradually increased as the patient will tolerate them.

2. The liver and spleen should be stimulated, fifth dorsal to ninth dorsal, right side for liver, left side for spleen).

3. Constipation is usually present, and should receive the treatment outlined under that heading.

Diathermy: Autocondensation handle in the hands, and block-tin electrodes on the soles of the feet, connected to the apparatus by a bifurcated cord; 500 to 1000 ma. for 30 minutes. Produces relaxation, warming of entire body, and elimination.

Ultraviolet Light: To stimulate general nutrition.

## MENOPAUSE, NERVOUS SYMPTOMS OF

Autocondensation.

High Frequency: Mild sparks along the spine, back of head and neck, over abdominal organs; total of 15 or 20 minutes.

Vibration: Same location; inhibitive technic.

## MENORRHAGIA

Galvanism: Use a copper intra-uterine electrode for the positive pole, insulated along the entire length except the portion actually within the uterine canal; negative pad may be on the abdomen. Not over 15 ma. for 15 to 30 minutes, once to twice a day. Reverse the current for a few moments before removing the electrode, to loosen the adhesions.

Vibration: Inhibitive treatment with ball applicator, medium stroke and pressure, eighth dorsal to twelfth dorsal and all lumbar and sacral spinal nerve roots.

Between periods, mild, gentle stimulation.

## MENSTRUATION, IRREGULAR

It is necessary to determine the cause. Then refer to various methods under headings for diseases of the female pelvic organs.

## METRORRHAGIA

See *Menorrhagia*.  
*Fibroids of Uterus*.



Illustration 32—Applying radiant heat to posterior aspect of chest with patient prone.



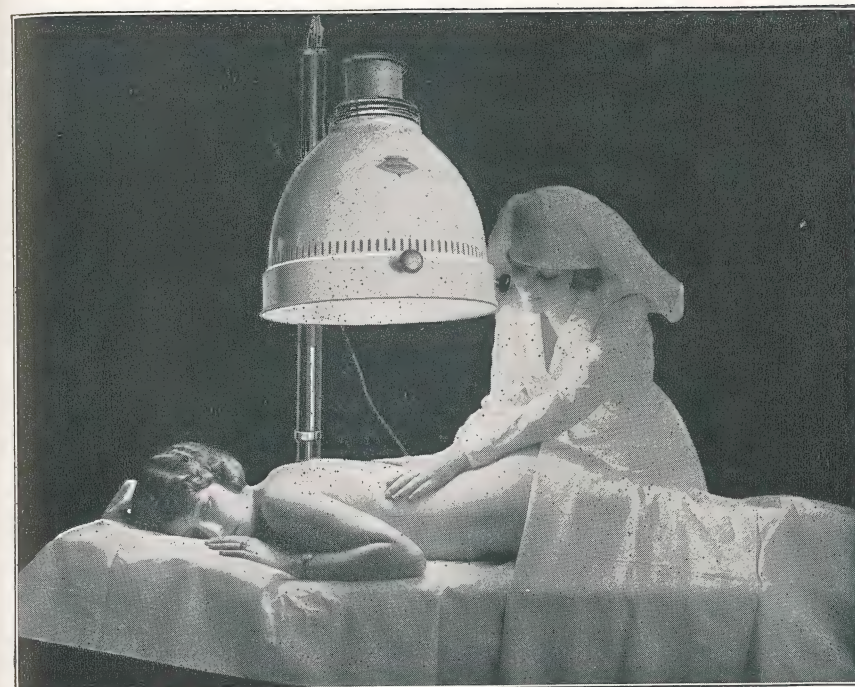


Illustration 33—Applying radiant heat to posterior aspect of chest with patient prone.



## MIGRAINE

See *Headache*.

Autocondensation.

Vibration: Look for spasm of muscles along the spine, from the occiput to the sacrum, and relax these.

## MOLES

See *Warts*.

## MOTOR POINTS

See diagrams showing the locations of motor-points of muscles for galvanic, faradic, or sinusoidal stimulation.

## MYOCARDITIS

Diathermy will build up the nutrition of the heart muscle. Treatments may need to be kept up a long time. The precordial electrode should be about 4 by 4 inches, and the one in the back, just exactly opposite, about 6 by 8 inches. 300 to 800 ma. for 20 minutes.

Autocondensation if blood pressure is high.

High frequency sparks to the spine and solar plexus if the blood pressure is low.

Ultraviolet Light: Radiant lamp, 10 minutes. Air-cooled lamp  $\frac{1}{2}$  to 5 minutes, 30 to 15 inches. Daily. General exposures and mild reaction.

## NAEVI

Galvanism: A needle, connected with the positive pole, passed through the mark, parallel with the epidermis; give  $\frac{1}{2}$  to 8 ma. (until the tissue is blanched). Cover the entire area in this manner. A crust is formed, which finally drops off, leaving a scar which is absorbed in a few months.

Diathermy: Coagulation by the indirect surgical method; i. e. with a large indifferent electrode at a distant portion of the body. See *Diathermy, Surgical*. Least desirable method, as keloids sometimes result.



Ultraviolet Light: Compression with water-cooled lamp, for five or more minutes, sufficient to produce tissue destruction. Keep the resulting vesicle bathed with boric acid or chlorazene, to prevent infection. Children respond better than adults.

## NAUSEA

Vibration: Prolonged vibration with deep pressure to third and fourth dorsal centers; also sixth to eleventh dorsal, inclusive.

## NEPHRITIS

No physiotherapeutic methods have been outlined for nephritis on a pathological basis. It has been possible to secure some relief for *Albuminuria*, q. v.

## NERVE INJURIES, PERIPHERAL

The following is given as a unified routine, rather than as a list from which to make a choice.

Diathermy should be given until degeneration is complete. When degeneration is complete, cease diathermy, as it obtunds the irritability of the muscle to galvanism.

Then use the slow-reversing galvanic sinusoidal through the limb from the spine to the hand or foot; one or two waves per second, of a current intensity one-fourth to one-third of that required to produce muscle contraction on the healthy side, for 10 to 15 minutes daily.

Following the above treatment each day, stimulate the individual muscles, one electrode at each end of the muscle; one stimulus per second. Give each muscle about three contractions each day. The muscle will not respond at the motor points at this stage.

When regeneration is complete, the motor point reactions appear; then exercise the muscles by motor point stimulation.

Then give passive, and finally active motion. All must be very gentle and gradual.

The above is taken from Sampson's work.

## NEURASTHENIA

Autocondensation, if the blood-pressure is high. (Autocondensation is contra-indicated in low blood pressure).

High Frequency: If blood pressure is low, sharp sparks up and down the spine for four or five minutes and for three minutes over the solar plexus; then over the eyes and back of the neck. Finish with ozone inhalation; 25 to 40 treatments may be required.

Ultraviolet Light: Radiant lamp, 30 minutes. Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 30 to 10 inches. Moderate reactions daily; general exposure.

Vibration: Look for sensitive spots over the spine, and give them inhibitive treatment with the ball vibrode. Stimulate cervical and dorsal nerve roots.

While it is, in general, against the tenets of modern medicine to treat symptoms instead of the underlying pathology, yet in this disease, it is necessary to treat symptoms. Technic for this purpose will be found under the names of the specific symptoms.

## NEURASTHENIA, SEXUAL

Use technic as given under *Urethra, Hypersensitive*.

## NEURALGIA

Refer to sections on specific neuralgias, *Supraorbital, Intercostal, Ovarian, Tic Douloureux*.

High Frequency:  $\frac{1}{2}$  to  $\frac{3}{4}$  inch spark intensity in light contact with the skin, over the painful area. Then a few sharp sparks for the counter-irritant effect.

Autocondensation if blood pressure is high.

Sharp sparks to spine and solar plexus if blood pressure is low.

Diathermy; technic as given under *Neuritis*.

Radiant lamp.

Galvanism: Use a pointed positive electrode over the sensitive portion of the nerve. (This must not be done in case the pain is of an inflammatory nature). Use current intensity to toleration.

Ionization of sodium salicylate, quinine, or cocaine.

Ultraviolet Light: Radiant lamp, 30 minutes; air-cooled lamp  $\frac{1}{2}$  to 10 minutes, 20 to 10 inches; water-cooled lamp,  $\frac{1}{4}$  to 3 minutes, at 1 inch. Severe local reaction; repeat when it begins to subside.

Infrared: Prolonged intensive technic.

Vibration: Inhibitive treatment with ball vibratode. See under *Vibration, General Technic*.



## NEURITIS

See *Sciatica*  
*Nerve Injuries, Peripheral*  
*Paralyzed Muscles*

**Galvanism:** The current should traverse the length of the nerve, from the spinal root (positive pole) to the extremity (negative pole), 6 to 8 ma. for 10 minutes. A slow-reversing galvanic sinusoidal is the best form of current.

**High Frequency:** At first a mild, sedative current (not over  $\frac{1}{4}$  inch spark intensity) from vacuum tube. The first few treatments may aggravate the pain. Be careful not to make the current too strong at the beginning. Later it may be increased.

**Diathermy** down the course of the nerve, as in galvanism; 800 to 2000 ma. for 30 minutes. This will also cause a temporary increase in the pain.

**Radiant Lamp.**

**Ultraviolet Light:**

Radiant lamp 20 minutes.

Air-cooled  $\frac{1}{2}$  to 5 minutes, 15 to 5 inches. Water-cooled,  $\frac{1}{4}$  to 3 inches, 2 inches; severe reaction; repeat when it begins to subside; local and general.

**Vibration:** Stimulative technic on all points of referred pain. (Soft applicator, rapid, short stroke; mild, increasing pressure. Also, stimulate spinal nerve roots of involved nerve, and the paralyzed muscles.

## NOCTURNAL EMISSIONS

**High Frequency:** Sparks to lumbar and sacral spine; and seven minutes treatment of the seminal vesicles with the rectal tube.

**Vibration:** Inhibitive technic to lumbar and sacral vertebrae; also to seminal vesicles with rectal attachment.

## OBESITY

**Surging Sinusoidal:** Several small (4 by 5) surface electrodes over the fatty areas; 40 to 60 surges per minute; treatments long and frequent; current intensity to toleration.

**Vibration:** 1. Medium stroke and pressure, medium speed, disk applicator, lateral stroke over the fatty parts.

2. Gradually increase the stroke and pressure to the limit of the patient's tolerance.

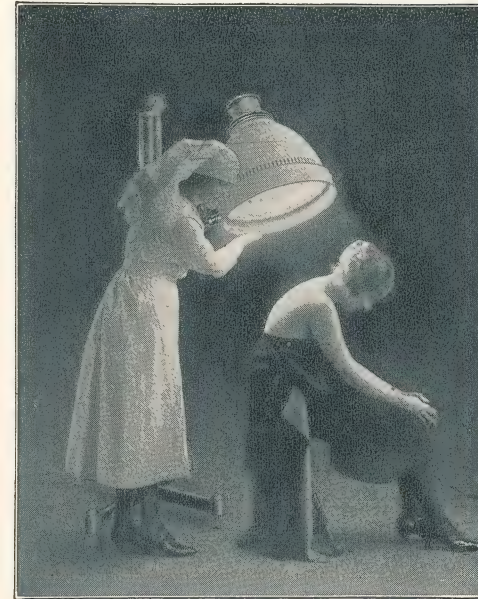


Illustration 34—Applying radiant heat to posterior aspect of cervical and dorsal regions with the patient sitting.



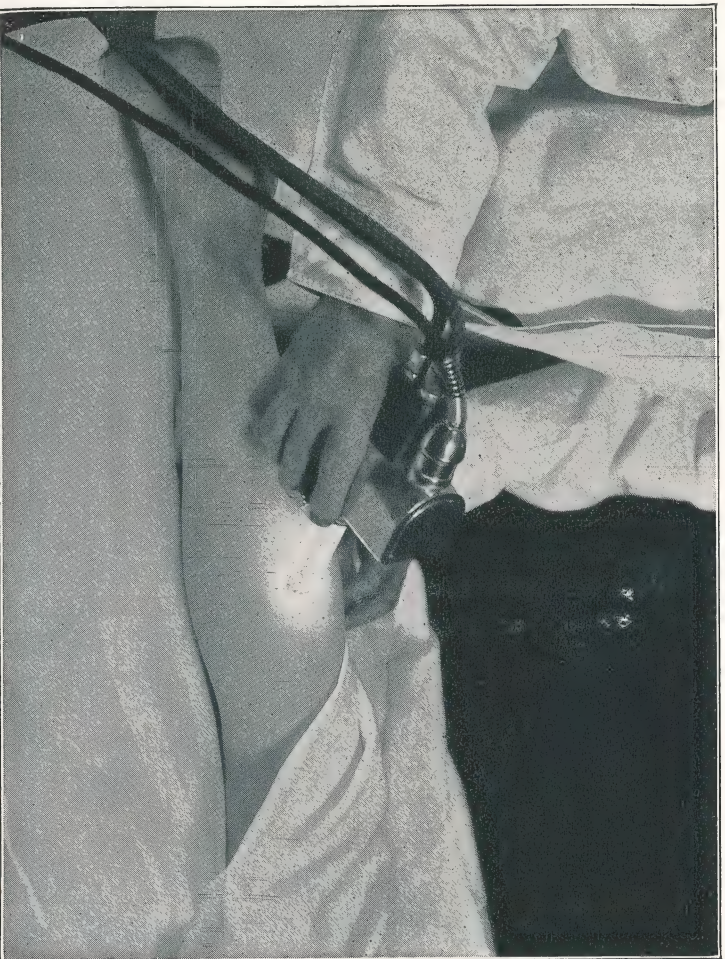


Illustration 35—Applying ultra violet light, from the water cooled lamp, on an ulcer of the leg.



3. Stimulate with medium stroke and pressure the adjacent lymphatics.

4. Stimulate the liver and spleen through their spinal centers; avoid all other spinal centers.

Give treatments daily, at first for 5 minutes, and then up to 20 or 30 minutes.

Autocondensation is recommended in the older writings, on the ground that it increases metabolism. The value of it is at present in question, for there is evidence to show that it decreases the metabolic rate.

## ONYCHIA

Ultraviolet Light:

Radiant lamp, 20 minutes.

Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 10 to 5 inches.

Water-cooled lamp  $\frac{1}{4}$  to 3 minutes, 1 inch.

Blister slightly, three times a week.

## ORCHITIS

Diathermy: By means of a cup with a metallic bottom, filled with 1 per cent salt solution, connected to one pole. For the other pole, the patient sits on a block-tin plate so that it comes in contact with the perineum.

Ultraviolet Light: Radiant lamp 45 minutes. Air-cooled lamp 1 to 5 minutes, 10 to 5 inches. Water cooled lamp,  $\frac{1}{2}$  to 2 minutes, 2 inches. Moderately severe reactions, daily.

See also *Epididymitis*.

## OSTEOMYELITIS

Diathermy: By means of cuffs, through the involved portion of the limb.

Ultraviolet Light: Radiant lamp, 45 minutes. Air cooled lamp,  $\frac{1}{2}$  to 10 minutes, 10 to 5 inches. Water-cooled lamp,  $\frac{1}{4}$  to 3 minutes, 2 inches to contact. Local and general treatments to mild reaction, daily.

The above are merely adjuncts to surgery.

## OTITIS MEDIA, ACUTE

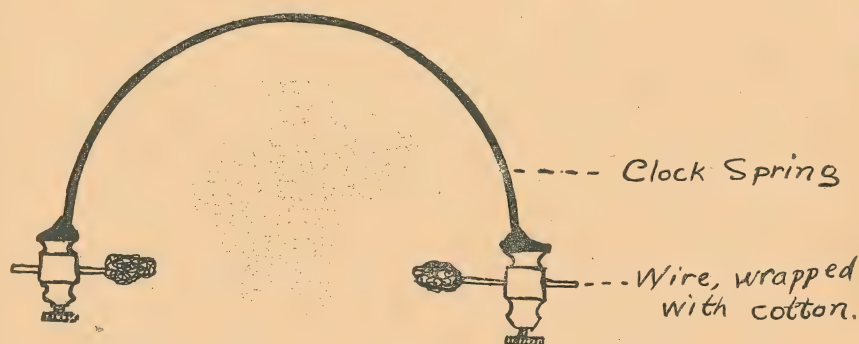
Radiant Lamp: Either on the bare skin, or through a layer of gauze kept moistened with isotonic zinc solution (for formula see *Ionization*). This will relieve pain.



**Galvanism:** Syringe the pus out of the external meatus, and wipe dry. Place the patient in a horizontal position with the diseased ear uppermost. Fill the ear with isotonic zinc solution (for formula see *Ionization*), and remove the air at the bottom of the meatus by suction with the syringe. Use a hard-rubber or horn ear speculum. Insert it and fill with the zinc solution. Connect with the positive pole, using an insulated wire, the end of which is scraped bare and cleaned, and wrapped lightly with cotton: This is then placed in the solution in the speculum. The negative pole is a pad placed at an indifferent portion of the body.

Start the current at zero and increase slowly to a maximum of about 5 ma. allow to run for 10 minutes, and as slowly decrease to zero. Avoid sudden increase or decrease of the current, as this shocks the patient. Watch the voltmeter during the treatment, as the better penetration of the zinc solution may result in an increase of current; or insoluble precipitates may decrease it. Watch the zinc solution in the speculum; keep the latter full. Some patients may be dizzy for a few moments from the effects of the current on the labyrinth, but this passes off in a few moments.

## OTITIS MEDIA, CHRONIC



See also *Deafness*.

**High Frequency,** through special ear electrode. The current must be very mild, otherwise a fulgurating effect may result from the small, pointed end of the electrode.

**Mechanical vibration,** with or without heated air.

**Surging Sinusoidal:** A binaural electrode may be devised from a strong clock-spring, or from a clip used for head phones in radio work. The wires that go into the ears should be insulated from the spring or clip, which is accomplished by wrapping both with tape. The ends of the wires should be wrapped with cotton to fit into the meatus, and this moistened with 1 per cent salt solution. Use 40 to 60 surges per second, and current intensity to tolerance.

If there is a discharge, use technic as given under *Otitis Media, Acute*.

## OVARIAN NEURALGIA

Pain in the ovarian regions is either a reflex, a neurosis, or inflammatory in nature. In case of reflex or neurotic pain, counter irritation is required.

**Vibration:** Stimulative technic over painful area, and over lumbar and sacral nerve roots.

**High Frequency:** Short, sharp sparks in the same regions. Vaginal application with "insulated" vacuum electrode, mild current intensity.

## OVARITIS

**Ultraviolet Light:** Radiant lamp, 30 minutes. Air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 20 to 10 inches. Water-cooled lamp,  $\frac{1}{4}$  to 2 minutes, with vaginal application protected at the outer extremity, to avoid producing a reaction on the exterior portions. Moderate reaction, three times a week.

**Diathermy:** Through the ovary, from the iliac region to the sacrum. Mild and prolonged treatment.

**Infrared Light:** Mild prolonged technic.

## OZENA

**Ultraviolet Light:** Water-cooled, 1 to 3 minutes, 1 inch to contact, daily to three times a week. First remove the scabs, by softening with alkaline spray. A quartz-rod applicator with etched surface so as to scatter the rays may be used; or a point-applicator may be used to produce a reaction at a number of points.

## PAIN, TO RELIEVE

See *Analgesia*.

**Vibration:** Vibration will relieve almost any sort of pain temporarily. Use inhibitive technic to the painful area, and to the spinal roots of the nerve supply.

## PALSY, CEREBRAL

See *Cerebral Palsy*.



## PARALYZED MUSCLES

**Galvanism:** Slow interrupted galvanic current, or slowly reversing galvanic current, or slowly reversing galvanic sinusoidal should be used. The current should pass through the affected muscle longitudinally, which is best accomplished by placing the positive electrode over the roots of the spinal nerve supply of the muscle, and the other at or beyond the extremity of the muscle. Do not overwork the muscle.

High frequency over the muscle will improve the nutrition. Short, sharp sparks will cause a slight movement of the muscle each time. Moving the electrode about in contact with the skin will increase the blood supply by dilating the capillaries. Also, sparks over the spinal nerve roots.

**Vibration:** 1. Ball vibratode, medium stroke and speed to spinal centers involved, 10 or 15 seconds each.

2. Medium length lateral stroke and medium speed, with soft rubber brush or vacuum ball over principal muscles affected.

3. Same technic to lymphatics of affected area.

Daily, over long periods of time.

See *Nerve Injuries, Peripheral; Atrophy, Muscular.*

## PERIOSTITIS

**Radiant Lamp.**

Diathermy, by means of cuffs; or in flat areas, by the indirect method.

**Ultraviolet Light:** Radiant lamp, 30 minutes; air-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 10 to 5 inches; water-cooled lamp,  $\frac{1}{4}$  to 3 minutes, 1 inch; mild reactions daily.

Adjuncts to surgery.

## PERTUSSIS

Ozone inhalations.

Diathermy to middle bronchial area.

Infrared to the same area.

**Ultraviolet Light:** Radiant lamp, 20 minutes; air-cooled lamp, 1 to 5 minutes, 20 to 10 inches. Mild reactions daily.

## PHARYNGITIS

**Ultraviolet Light:** Special pharyngeal applicator. Air-cooled lamp, 1 to 5 minutes; water-cooled, 1 to 2 minutes.

**Vibration:** See technic given under *Tonsillitis.*

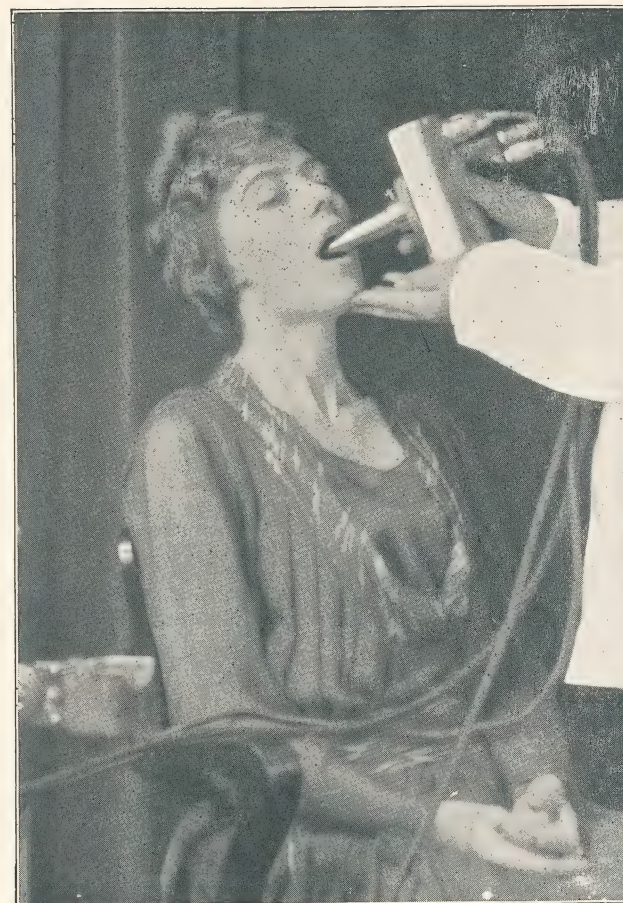


Illustration 36 (A and B)—Applying ultra violet light from the water cooled lamp into the pharynx.





Illustration 36 (A and B)—Applying ultra violet light from the water cooled lamp into the pharynx.



## PHLEBITIS

Diathermy along the length of the vein, by means of cuff applicators.  
 Ultraviolet Light: Radiant lamp, 45 minutes; air-cooled lamp,  $\frac{1}{2}$  to 8 minutes, 20 to 10 inches; water-cooled lamp,  $\frac{1}{4}$  to 3 minutes, 1 inch. Mild reactions daily.

## PLEURISY, ACUTE

Infrared Light: Mild prolonged technic is very effective.

High Frequency:  $\frac{1}{2}$  to  $\frac{1}{4}$  inch spark intensity through a layer of underclothing; continue till the skin is reddened, two or three times a day if needed.

Diathermy: Indirect method, as it concentrates the heat near the electrode.

Ultraviolet Light: air-cooled lamp, three to five minutes, 24 inches; moderate reaction, daily.

## PNEUMONIA

Diathermy through the involved lobe, twice a day. Current intensity to toleration.

Infrared Light: Moderate intensive for 40 minutes each, from the front and back. Then on the thighs and hips, to deplete the congested lungs; and back again to the lungs.

## PREGNANCY, ECTOPIC

See *Ectopic Pregnancy*.

## PROCTITIS

Ultraviolet Light: Rectal applicator; water-cooled lamp, 1 to 3 minutes; mild reaction daily to three times a week.

## PROLAPSE OF UTERUS

Galvanism: Carbon-ball electrode in vagina, connected to positive pole; negative pad on abdomen; 15 ma. for 10 minutes. Then follow by the technic given under *Backache Due to Pelvic Disease*. Do not use vaseline as a lubricant.



If the patient complains of deep pain or soreness after the treatment, look out for a pus tube. In the presence of pus it is dangerous to carry on this treatment.

See also *Uterine Malposition*.

## PROSTATIC HYPERTROPHY

Surging Sinusoidal: 6 by 8 inch indifferent electrode on the abdomen; special prostatic electrode against the prostate. Use a current intensity sufficiently strong to be felt in the rectum, and from 20 to 60 surges per minute. Treat three times a week at the beginning, and then less often.

High Frequency with insulated rectal electrode.

Diathermy with glass vacuum electrode, insulated rectal; this to be connected to one pole of the d'Arsonval terminals, and the other pole to an indifferent block-tin electrode on the abdomen.

Ultraviolet Light: Same technic as given under *Prostatitis, Chronic*.

Ionization of thiosinamin with the positive pole, by means of the electrode described under *Prostatitis, Chronic*; 10 ma. for 10 minutes every fourth day.

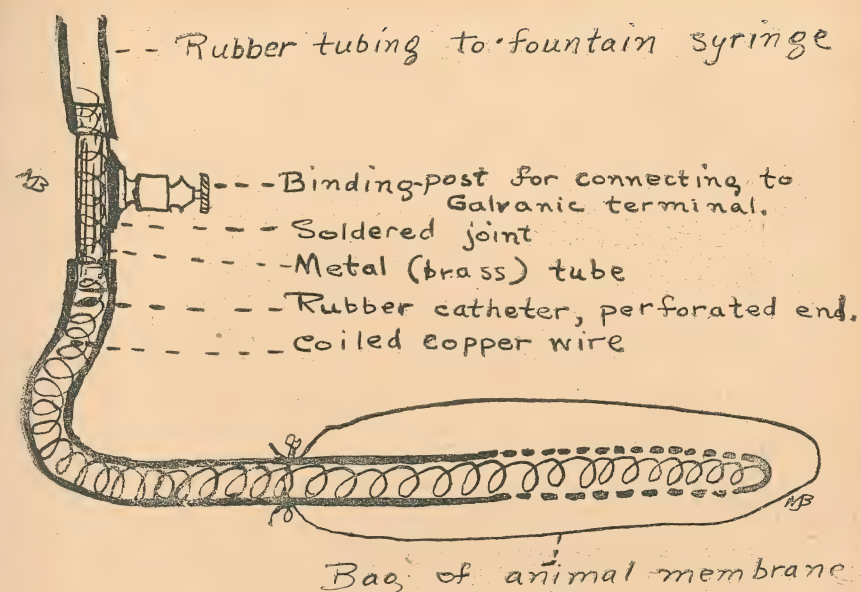
Vibration: See technic under *Prostatitis, Chronic*.

## PROSTATITIS, CHRONIC

Look for etiological factors, especially urethral pathology, the treatment of which can be found under appropriate headings.

Surging Sinusoidal: By means of the surging sinusoidal technic outlined under *Prostatic Hypertrophy*, manual prostatic massage and its effects can be simulated.

Galvanism: Make an electrode of a soft-rubber rectal tube; the end should be perforated with small holes for two and three-fourths inches. Insert within this tube, a coil of wire made by winding the wire around a rod or wire of appropriate diameter. Around the end of the tube tie a bag of kid, sausage-skin or other animal membrane, kept distended by pressure from a fountain-syringe, filled with isotonic salt solution, for the formula of which see *Ionization*. This should be connected with the positive pole, as shown in the illustration; the negative pad may be placed on the abdomen. Give 30 to 40 ma. for 10 minutes, three times a week.



Ultraviolet Light: Special applicator; water-cooled lamp 1 to 3 minutes; moderate reactions, three times a week.

Diathermy: With metal rectal applicator, or through glass vacuum electrode, as given under *Prostatic Hypertrophy*.

Vibration: 1. Spinal stimulation, first lumbar to coccyx; half vibration, medium stroke, medium pressure, 6 to 10 seconds over each point, repeating several times.

2. Prostatic applicator, short stroke, heavy pressure, lateral stroke, two to five minutes.

3. Soft rubber applicator, with same stroke, on the perineum.

4. Medium lateral stroke, medium speed, inguinal lymphatics. 10 to 15 minutes daily at first, and then three times a week.

## PRURITUS: ANI, VULVAE, PERINII

Ionization: Use a flexible pad, which may be improvised of block tin, wrapped with gauze soaked in isotonic zinc solution (for formula see *Ionization*), and connected with the positive pole. The negative pole should be a large pad under the buttocks. Sim's position is preferable. The current intensity should be sufficient for the patient to feel warmth; treat for 20 minutes. Two to five treatments will be required. Ointments should not be used, as they interfere with the passage of the current. Keep the parts clean with soap and water.

If there is cutaneous or subcutaneous thickening, use Lugol's solution as the electrolyte.



Ultraviolet Light: Air-cooled lamp, 2 to 10 minutes, 10 to 5 inches; water-cooled lamp,  $\frac{1}{4}$  to 3 minutes, 2 inches; moderately severe reaction, repeated as soon as the preceding one begins to subside.

High Frequency: Sharp sparks from vacuum electrode till skin is red-dened.

## PSORIASIS

High Frequency: Same technic as given under *Eczema*.

Ultraviolet Light: The lesions can be readily caused to disappear, but there is always a probability of their returning.

Radiant lamp, 20 minutes. Air cooled lamp, 2 to 10 minutes, 10 to 5 inches; water-cooled lamp,  $\frac{1}{2}$  to 3 minutes, 2 inches. Daily to twice a week. Give heavy doses and secure violent reactions. Repeat when preceding reaction subsides.

Sampson recommends that actinotherapy be preceded by "ionizing" doses of x-ray.

X-rays, q. v.

## PYORRHEA

Ultraviolet Light: Water-cooled lamp, quartz-rod applicator; sufficient exposure to produce a violent tissue reaction. Compression, to secure maximum penetration, should be used.

## RADIANT LAMP

Physiological Effects: These are from both the heat and the light.

### Heat:

- Prouces hyperemia and dilatation of capillaries.
- Relieves pain.
- Raises temperature.
- Increases metabolism.
- Lowers leukocytosis.

### Light:

- Blue is soothing, sedative, and analgistic.
- Red is irritating.
- Green and yellow stimulate growth.

## RECTOCELE

Use the same technic as given under *Cystocele*.



Illustration 37—Applying infra red to forehead.



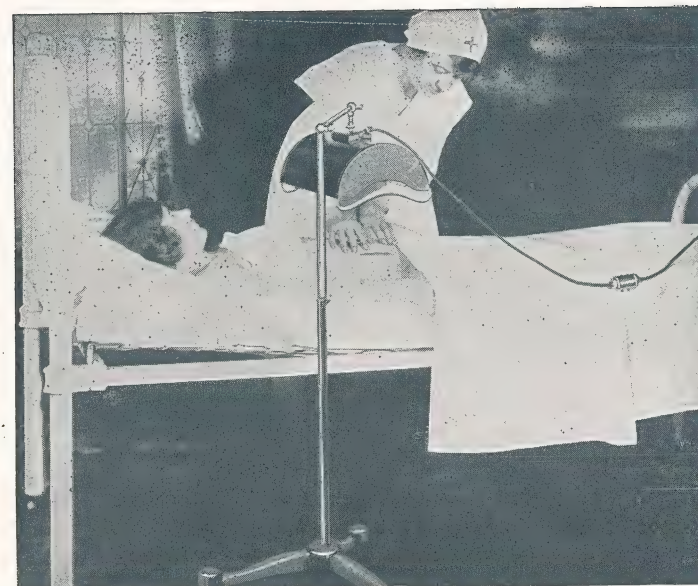


Illustration 38—Applying infra red to pelvic region.



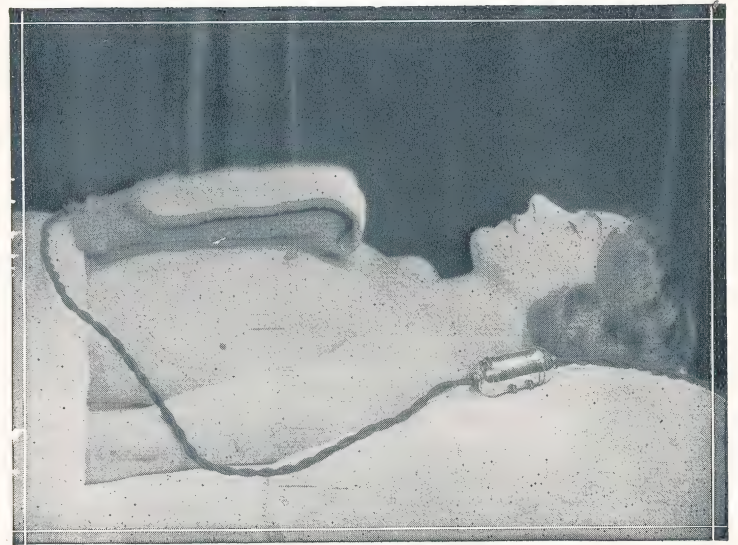


Illustration 39—Applying infra red to anterior surface of chest.





Illustration 40—Applying infra red to dorsal surface of chest.



## RETROVERSION

Follow the technic as given under *Prolapse of Uterus*.  
See also *Uterine Malposition*.

## RHEUMATISM, ACUTE, (For Chronic Rheumatism, see Arthritis).

Galvanism: Allow the current to traverse the inflamed joint by means of pads used as cuffs; the positive pole above, and the negative below.

Diathermy: Apply through the joint, by means of block-tin cuff electrodes above and below the inflamed joint.

Radiant Lamp.

High Frequency: Mild current ( $\frac{1}{4}$  to  $\frac{1}{2}$  inch spark intensity) with glass vacuum electrode in contact.

Ultraviolet Light: Radiant lamp, 30 minutes; air-cooled, 1 to 8 minutes, 20 to 10 inches; water-cooled lamp,  $\frac{1}{4}$  to 2 minutes, 2 inches. In gonorrheal rheumatism, increase dosage 25 to 50 per cent.

## RHINITIS, ATROPHIC

Ultraviolet Light: Use the same technic as given under *Rhinitis, Hypertrophic*.

## RHINITIS, HYPERTROPHIC

Ionization: Use a copper wire, wrapped with cotton saturated with 1/1000 adrenalin chloride solution, or isotonic zinc or copper solution (for formula, see *Ionization*), as the positive pole. Place the negative pad on the back of the neck. Apply every other day.

Ultraviolet Light: Radiant lamp 20 minutes: Water-cooled 2 to 4 minutes, 1 inch to contact. An etched quartz applicator that scatters the rays laterally may be used; or the reaction may be produced at a number of points by means of a point applicator.

## RHINOPHYMA

## RHINOSCLEROMA

Ultraviolet Light: Radiant lamp, 20 minutes; air-cooled lamp, 1 to 8



minutes, 20 to 10 inches. Water-cooled lamp,  $\frac{1}{2}$  to 3 minutes 1 inch. Secure a heavy reaction with blistering, and repeat when preceding reaction has begun to subside.

## RHUS TOX POISONING (Poison Ivy).

Ultraviolet Light: Use the longer rays, by making the exposures at long distances, 24 to 30 inches (the air filters out the shorter rays); and give mild and frequent reactions.

## RICKETS

Ultraviolet light increases the calcium metabolism, q. v.  
Infrared: Mild prolonged technic over the thymus and parathyroids.

## SACRO-ILIAC ARTHRITIS

Syphilis must be excluded, as it is apparently not benefited by physiotherapeutic methods, according to present evidence.

Diathermy: The indirect method is best, as it concentrates the heat in the vicinity of the electrode.

Radiant lamp, for long periods, several hours.

Infrared: Mild, prolonged, for two to four hours daily.

Vibration: Short, rapid, lateral stroke, soft applicator, light contact, treatment for 10 or 15 minutes.

## SALPINGITIS

Physiotherapy is contra-indicated where there is enclosed pus.

Diathermy from pubis to sacrum; electrodes of equal size; current intensity mild, and time 30 minutes, once or twice a day.

Ultraviolet Light: Radiant lamp, 30 minutes; air-cooled lamp,  $\frac{1}{2}$  to 8 minutes, 20 to 10 inches; water-cooled lamp,  $\frac{1}{4}$  to 2 min.; vaginal applicator, with the external portion protected by adhesive tape, so as to avoid producing a reaction on the external parts. Produce mild reactions, two or three times a week.

## SARCOMA

X-Ray, q. v.

Ultraviolet Light: As accessory to radical treatment radiant lamp, 20 minutes; air-cooled, 1 to 10 minutes, 20 to 10 inches; water-cooled lamp,  $\frac{1}{2}$  to 5 minutes, 2 inches; moderate reactions daily.

## SCARS

High Frequency: Sparks from the vacuum tube will soften the scar. Even treatment with the tube in contact will have the same effect, if persisted in long enough.

Fulguration: Produce only the mildest of superficial coagulation; otherwise the scar will be worse, or even keloids may result.

Ionization (q. v.) with sodium iodide or sodium chloride on the negative pole.

*Ionization of thiosinamin:* use an anode of block tin, wrapped in gauze so as to make a pad, and saturated with the following solution:

Thiosinamin .....	20 grains
Sodium chloride .....	5 grains
Glycerin .....	2 drams
Water .....	6 ounces

Use current of 3 to 20 ma. for 10 minutes, and repeat when the dead skin over the scar can be peeled off.

## SCIATICA

See also *Neuritis*, and *Nerve Injury, Peripheral*.

Galvanism: Positive pad to the sacral and gluteal region, negative pad to the back of the leg and ankle; use a current of 10 to 15 ma. for 10 minutes.

Surging Sinusoidal: Use to stimulate the paralyzed muscles, and maintain nutrition.

Diathermy: Electrodes placed as in galvanism, and the current passed down the length of the nerve.

High Frequency: Use the vacuum tube along the course of the nerve and the lower part of the spine; adjust the current to a  $\frac{1}{2}$  to 1 inch spark intensity, and treat for 10 to 15 minutes, daily.

Radiant Lamp.

Ultraviolet Light: Radiant lamp, 30 minutes; air-cooled lamp  $\frac{1}{2}$  to 5 minutes, 20 to 10 inches; water-cooled,  $\frac{1}{2}$  to 2 min., 1 inch. Moderately severe reactions, 2 or 3 times a week.

Vibration: Hard applicator, rapid, medium length stroke, light to medium pressure on all spinal nerve roots from ninth dorsal to and including fifth lumbar. Then, on the hard, contracted muscles of the gluteal region until relaxed; and the sciatic nerve at the sacro-sciatic notch. Use stimulating technic to all the muscles supplied by the sciatic nerve.



## SCOLIOSIS, FUNCTIONAL

Surging sinusoidal: } Stimulate the weakened muscles, by applying the  
Galvanism: } current at their motor points. Start with mild stimuli, applied for a short time only, being very careful not to overwork the muscles. As they increase in strength, the amount of the stimulus and the length of time for which it is applied can be increased.

Vibration: Use stimulating technic on the weak or concave side, both to the muscles, and the spinal roots of their nerve supply.

Functional scoliosis is usually a reflex due to intrathoracic disease. Use the proper modalities for the latter; for these refer to the appropriate title.

## SEASICKNESS

Use the same technic as given for *Nausea*.

## SEBORRHEA

High Frequency:  $\frac{1}{4}$  to  $\frac{1}{2}$  inch spark intensity, in light contact with the scalp; treat for 10 minutes, three to six times per week.

Ultraviolet Light: The chief difficulty with this treatment is that it is difficult to secure the penetration of the light to the scalp itself; the hair readily absorbs it. The only way to secure the effect of the light on the scalp, without shaving the hair, is for an attendant to stand over the patient during the entire treatment, and constantly keep the hair separated and the scalp exposed in different localities, by means of a comb.

Radiant lamp, 20 minutes. Air-cooled lamp, 1 to 5 minutes, 10 to 5 inches; water-cooled lamp,  $\frac{1}{2}$  to 2 minutes, 1 inch. Secure heavy reactions, and repeat when the preceding reaction begins to subside.

## SEPTICEMIA

Ultraviolet Light: Radiant lamp, 30 minutes; air-cooled lamp 1 to 10 minutes, 10 to 5 inches; water-cooled lamp,  $\frac{1}{2}$  to 2 minutes, 2 inches; mild reactions daily.

## SEXUAL NEURASTHENIA

Use the technic as given under *Urethra, Hypersensitive*.

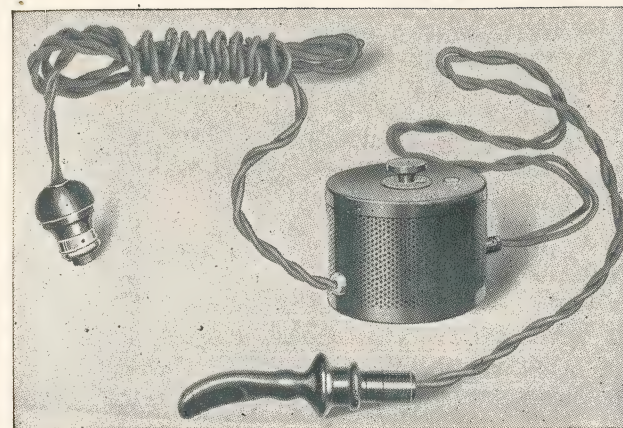


Illustration 41—Infra red prostatic applicator.





Illustration 42—Application of radiant heat to mastoid region, using a cone to focus the light accurately.



## SINUS HEADACHE

See Headache.

## SINUSITIS

Distinguish between cases in which physiotherapy is adequate, and those in which it is palliative or accessory.

High Frequency: Medium intensity of current, light contact, over painful areas.

Vibration, over the diseased sinus.

Diathermy: Indirect technic, with special nasal applicator.

Ultraviolet Light: Radiant lamp externally, 45 minutes. The actinic light may be applied externally, but this has the disadvantage of producing disfiguring discolorations, the tan persisting for many weeks or months. By means of quartz rods, reactions may be produced on the mucous membrane of the nose, where it is more efficacious. An etched rod may be used to disperse the rays laterally; or reactions may be produced at small points by the point applicator.

## SPINAL STIMULATION, RATIONALE OF

The first diagram illustrates the visceral relations through the sympathetic and vagus systems, to the spinal cord segments.

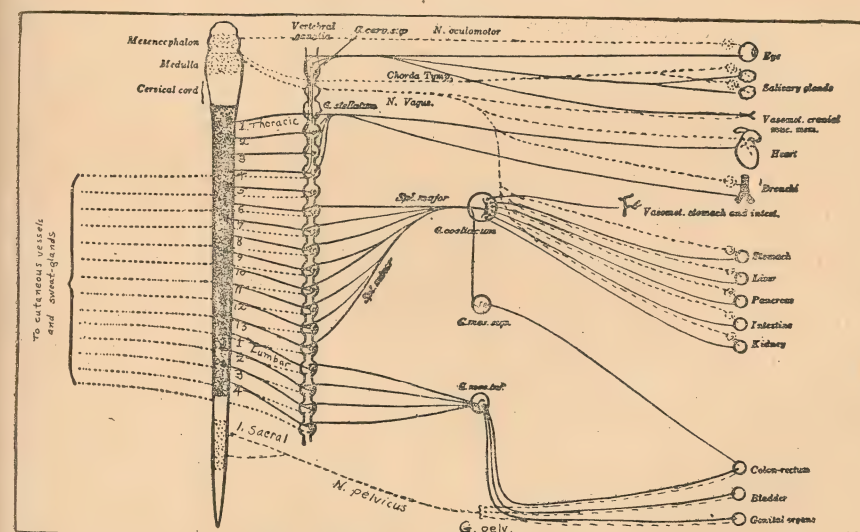


Diagram I Rationale of Spinal Stimulation

The second diagram illustrates the relation of the spinal cord segments to the spines of the vertebrae which may be used as external landmarks.



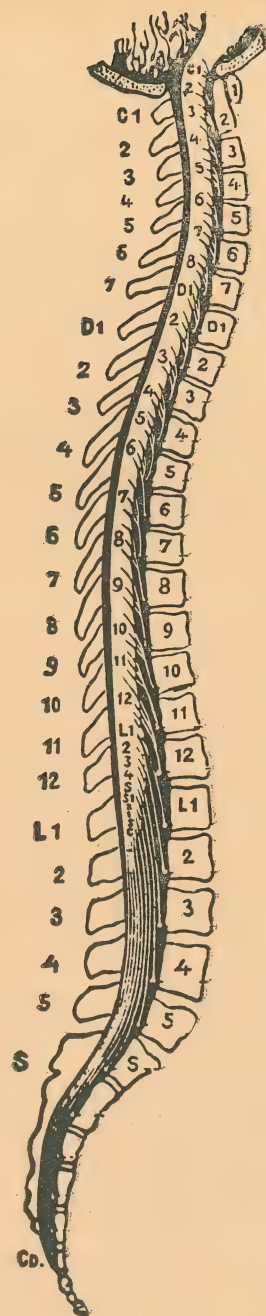


Diagram II - Rationale of Spinal Stimulation.

## SPRAINS

Radiant lamp.

Infrared Light: Mild, prolonged technic.

Ultraviolet Light: Produce a severe reaction. This will increase the disability temporarily, but the reaction will shorten the healing time, so that the total length of time during which the patient is disabled, will be much shortened.

## STENOSIS OF LARGER CANALS

## STRICTURE OF LARGER CANALS

Esophagus.

Rectum.

Eustachian tube.

No definite technic is available, but the principle on which the problem is attacked would be identical with that underlying the method of treating stricture of the urethra and of the cervix uteri, q. v.

## STRICTURE OF THE URETHRA

See *Urethra, Stricture of*.

## SUPPURATION

Use the technic as given under *Abscess*.

Physiotherapy is contra-indicated in inclosed, indrained suppuration.

## SUPRA-ORBITAL NEURALGIA

May be due to sinus disease, q. v.

Vibration: Soft applicator, short, rapid, lateral stroke, medium pressure, 5 to 10 minutes' time.



## SYCOSIS

Ultraviolet Light: Clip the hair, in order to allow the light access to the skin or scalp. The presence of hair absorbs the rays and renders the treatment ineffective.

Air-cooled lamp, 2 to 10 minutes, 10 to 5 inches.

Water-cooled lamp,  $\frac{1}{2}$  to 3 minutes, 1 inch; produce severe reactions, and repeat when preceding reaction has begun to subside.

## SYNOVITIS

Ultraviolet Light: Radiant lamp, 30 minutes. Air-cooled lamp, 1 to 8 minutes, 10 to 5 inches; water-cooled lamp,  $\frac{1}{4}$  to 2 minutes, 1 inch. Moderate reactions, daily or every second day.

Infrared Light: Mild, prolonged technic.

## SYPHILIS

Physiotherapy is useful as an aid to specific treatment, in building up the general systemic health. It has no specific value against the treponema.

Ultraviolet light is especially useful in the skin conditions.

Autocondensation is a stimulant to the general metabolism.

High frequency	} To promote absorption of exudates.
Ionization	

## TABES DORSALIS

The chief reason for the traditional reputation of tabes dorsalis for incurability, is the inaccessibility of the pathological process to therapeutic methods. The chief aim of physiotherapeutic methods is to produce a hyperemic reaction in the blood vessels of the meninges of the spinal cord, and to keep up the nourishment of the affected muscles and peripheral nerves.

Sampson's technic:

First: Diathermy from front to back, through the affected portion of the cord.

Second: Static or high frequency discharge by means of sharp sparks, to the area.

Third: "Ionizing" doses of x-ray.

Vibration: 1. Heavy vibration with ball applicator, long stroke, medium speed, to all spinal centers and to sciatic notch, with as much

pressure as the patient can stand; 20 to 30 seconds over each point.

2. Rotary or lateral stroke, medium pressure and length, to calf and posterior median line of leg.

3. Brush with light pressure, high speed, lateral stroke, over hypersensitive areas until inhibition is accomplished. Same stroke for 20 seconds over anesthetic areas.

See also technic under  
*Nerve Injury, Peripheral.*  
*Paralyzed Muscles.*

## TATOO, POWDER, AND COAL MARKS

Fulguration: The discolored area is fulgurated with a fine needle by cross-marks  $\frac{1}{8}$  inch apart. The desiccated epidermis is removed by a blunt curette. Then, the area is macerated for three days with salt solution, containing chlorazene, to prevent infection; after which the pigment may be removed with a spud curette. The wound heals rapidly.

The desiccation must be only superficial, otherwise scars or keloids will result.

## TETANY

Ultraviolet light will increase the *Calcium Metabolism*, q. v.

## TIC DOULOUREUX

High Frequency: Medium intensity of current, contact, with vacuum electrode; prolonged treatment.

Diathermy through the affected muscles.

Vibration: Cushioned applicator, rapid, short stroke, medium pressure, over the affected muscles. The stimulating technic to spinal nerve roots from second cervical to third dorsal.

Ultraviolet light, to the face and spine.

## TINEA, ALL VARIETIES

Ultraviolet Light. Air-cooled,  $\frac{1}{2}$  to 10 minutes, 10 to 5 inches; water-cooled,  $\frac{1}{4}$  to 2 minutes, 2 inches. Secure severe reaction, and repeat if necessary. Usually one treatment suffices.



## TINNITUS AURIUM:

Use technic given under *Otitis Media, Chronic*.

## TONSILLITIS:

1. Tonsils hypertrophied but not infected, large, smooth, hard and pate; a hyperfunctioning tonsil. All infection is overcome locally at the tonsil; there is no inflammation, and no general immunization. The removal of such a tonsil, with the sudden removal of its protective influence from the gateway through which infection enters the body, may be a disastrous thing.

Their size should be reduced, and defensive power lowered, by means of the x-ray (q. v.) or by means of diathermy. For diathermy use low voltage; have the patient hold the autocondensation handle in one hand as one pole. Use an aluminum probe, protected by rubber tubing, with the exception of  $\frac{1}{8}$  inch of the end, and turn the current on and off by means of a foot switch. Treat several points on each tonsil till the tissue turns white around the end of the electrode, and wait until the reaction heals before repeating, if repetition is required.

2. Slightly enlarged, normally reddened tonsil, in a state of active immunization. Such a tonsil is functioning as nature intended that it should, and should be let alone, unless the general systemic condition indicates directly that infection is being absorbed from some source, and general systemic treatment is insufficient to handle the situation. In such a case, do not remove the immunizing activity totally, so that future impairment of normalcy will not be followed by an outburst of infection. The best treatment is to lower the bacterial activity by means of the ultraviolet light, with the water-cooled lamp. The methods given in the above section are also applicable. Warn the patient that a reaction will take place, and that he will have some pain for a day or two.
3. Infected tonsils, with pus in the crypts, and enlarged lymph nodes: Here the immunizing value is lost, because of pathological changes. This is the condition in which surgical removal is best, although surgical diathermy may be used.

Advantages of diathermy over other methods:

- No surgical shock.
- No danger of embolism.
- No danger of metastatic infection or of toxic absorption.
- No trauma to adjacent tissues.
- Complete sterilization.
- No contracting cicatrix.
- Retention of normal tonsillar tissue.
- No danger of hemorrhage.
- No open wound to become secondarily infected.

The medical profession is even now beginning to get over the furor for the wholesale and indiscriminate removal of all tonsils that are not quite normal. In a generation from now, medical men will hold up their hands in horror at our present-day barbarity in this respect. It is no more logical to remove every abnormal tonsil, than to remove every abnormal finger. The tonsil, with its function of trapping infection, and building up the systemic immunity, is quite as important, and more so, to the individual, than a finger.

Vibration: Palliative for acute infection:

1. Ball attachment, heavy pressure, 20 to 30 seconds to all cervical spinal nerve roots, down to fifth dorsal.
2. Soft ball or brush to the front and sides of the neck well up under the angle of the jaw; medium length and pressure, high speed.
3. Same applicator and stroke to cervical and axillary lymphatics.

Daily.

## TORTICOLLIS

High frequency along the sterno-mastoid muscle; light contact or short, sharp sparks.

Vibration: Rapid, short stroke, medium or deep pressure, on the contracted muscle till relaxed. Then, on second, third and fourth cervical spinal nerve roots on affected side. Hard applicator on the cervical plexus, along the anterior border of the sterno-mastoid, with interrupted vibration, on for three seconds and off for one second.

## TRACHOMA

Ionization of copper: A disk of copper  $\frac{1}{4}$  inch in diameter, as the positive pole, applied to the granulations under local anesthesia. Keep moving the electrode around while the current is passing, to prevent its adhering to the conjunctiva.

## TUBERCULOSIS, Miscellaneous

### Actinotherapy.

Location	Radiant Lamp	Air-Cooled Lamp	Water-cooled Lamp	Reaction
Bones & Joints....	30 min.	1 -10 min.; 20-10 in.	$\frac{1}{2}$ -3 min.; 2 in.	Mild, frequent
Laryngeal.....	20 min.	$\frac{1}{2}$ -10 min.; 10-5 in.	$\frac{1}{2}$ -2 min.; Cont.	Cross-fire
Peritoneal.....	30 min.	1 -10 min.; 20-10 in.	.....	Severe
Rectum.....	20 min.	1 -10 min.; 20-10 in.	1-5 min. rectal application	Mild, frequent.
Skin.....	20 min.	2 -15 min.; 10-5 in.	$\frac{1}{2}$ -5 min.; 2 in.	Severe



## TUBERCULOSIS, PULMONARY

Ozone inhalation.

Diathermy through the site of the lesion. First rule out the danger of hemorrhage, as diathermy by increasing the local blood supply may start an incipient hemorrhage. It is the writer's opinion that the danger to the life or safety of the patient from a hemorrhage is not very great; but in the average case it has a tremendously bad psychological influence on the progress of the cure.

Use the same technic as given under *Pneumonia*. Cough and expectoration will be increased for the time being, and, temporarily, the patient may seem worse. But improvement follows rapidly. Treatments should be daily, for several weeks.

Ultraviolet Light: This, in some cases, acts almost like a specific. The value of the preliminary exposure to the radiant lamp is being questioned today. The writer has discarded its use.

Air-cooled lamp: Test the patient's tolerance, as given under

*Ultraviolet Light, Test for Patient's Tolerance*, and proceed on that basis, with mild reactions daily, until the patient is well tanned all over the body.

Infrared Light: The same cautionary remarks apply here as under *Diathermy*.

## TUBERCULOUS GLANDS

Follow the technic outlined under *Adenitis*. Results will be much slower in coming than in other forms of adenitis, and treatments must be continued over a longer time.

## TURBINATES, HYPERTROPHIED

Ultraviolet Light: Water-cooled lamp, 1 to 5 minutes; produce a local reaction with a quartz-rod applicator.

Electrocautery: The cauterization of a small spot on the turbinate will often give the desired relief.

## ULCERS, CHRONIC

See *Gastric Ulcer*  
*Duodenal Ulcer*  
*Varicose Ulcer*  
*Abscess*  
*Chancroid*

Ultraviolet light: Stimulates the healing; reactions must be mild, and frequently repeated.

High Frequency: Sharp sparks from the vacuum tube have a stimulating and germicidal action, and convert the chronic condition into an acute one, which quickly heals.

## ULTRAVIOLET LIGHT, CONTRA-INDICATIONS

All writers agree that the ultraviolet light should not be used in diabetes, though thus far, no explanation of the reason has been offered.

If for some reason it should be necessary to use light in diabetes, begin with a dose of 10 per cent of the normal, and feel your way cautiously.

Do not use ultraviolet light during menstruation, or in cases where there is a possibility of hemorrhage. While the light is indicated in the treatment of pulmonary tuberculosis and peptic ulcer, yet it is necessary to proceed cautiously; for in cases where a hemorrhage is incipient, the hyperemia produced by the light may precipitate it.

## ULTRAVIOLET LIGHT, DOSAGE, TO DETERMINE

See *Ultraviolet Light, Testing Patient's Tolerance to*.

## ULTRAVIOLET LIGHT, FAILURE, CAUSES OF

Defective burner: This will usually manifest itself by abnormal behavior on the part of the arc.

Carbon adhering to the quartz, or other lack of absolute cleanliness of the quartz.

Lack of absolute cleanliness of exposed surface of patient: Scabs and crusts, face-powder, wound-secretions, and numerous foreign matters, will obstruct the passage of the light.



## ULTRAVIOLET LIGHT, GENERAL TECHNIC

The operator's eyes should be protected by glasses. Some individuals will develop a tolerance to the light; others do not seem to be able to do so.

Protect the patient's eyes with glasses or cotton.

The exposed surface must be absolutely clean. Almost any foreign matter, as face powder or wound secretions, obstructs the passage of the rays. Ointments, and the shrinking of capillaries with cocaine, will defeat the object of the treatment, and results in failure. The rays will not penetrate dead epidermis or dressings.

Follow manufacturer's directions carefully in regard to operating the lamps. Read them over once a week, to check yourself up and to see if you have not forgotten something or been doing something incorrectly.

Clicking and knocking are danger signs; look to the voltage on the rectifier.

It is best to give mild reactions, and repeat them when the preceding reaction begins to subside. In this way, results can be better controlled.

In treating skin lesions, protect the surrounding normal skin, which is more sensitive to the light than the diseased area.

Until recently, it was taught that for general treatments of systemic conditions, it was best to precede the exposure to ultraviolet light by a treatment with the radiant lamp, on the grounds that the latter dilated the peripheral capillaries and brought the blood to the surface; that this would promote the absorption of more of the light and more extensive transportation of the light or its beneficial effects, to the interior of the body, since it had been demonstrated that blood absorbs the rays far more extensively than any other tissue. Recently, both clinical and experimental evidence has been brought out to show that the preliminary exposure to the radiant lamp is at least not necessary. Sampson goes so far as to say that it is detrimental to best results. The writer has discontinued the preliminary exposure to the radiant lamp, except in cases where intense local reactions are desired, in which case the radiant lamp seems to increase the amount of the reaction.

To secure sedative and constructive effects, make use of the longer wave-lengths. These predominate in the light from the air-cooled lamp. Exposures at long distances secure the largest percentage of long wave-lengths, as the passage through the air filters out the shorter wave-lengths.

To secure irritation and destructive action, use the short wave-lengths, which predominate in the light from the water-cooled lamp, and can be secured to a considerable extent by exposures from the air-cooled lamp at short distances.

## ULTRAVIOLET LIGHT, PHYSIOLOGY

### General:

Ultraviolet light is constructive, in contradistinction to x-rays, which are destructive.

It is absorbed by protoplasm, and utilized to the benefit of the latter. Blood absorbs the light to a greater extent than any

It produces a benign inflammation of the skin and mucous membrane. Destruction with scarring cannot occur under any other tissue.

Exposures ordinarily used in medical work. Even the most severe reactions recover without leaving any traces except temporary pigmentation or tanning. The effects are exactly like sunburn.

It increases the immunogenic powers of the body, increases red cells, normalizes the white cells, and destroys bacteria (but not protozoa nor spirochetes).

It may destroy immature granulation tissue, by occlusion of newly-formed capillaries by exudate.

It kills bacteria.

Air-cooled lamp  
Near-ultraviolet intensity  
Dominantly biologic  
Chemically oxidizing  
Relatively penetrating  
Metabolically synergistic

Water-cooled lamp  
Far-ultraviolet intensity  
Dominantly abiotic  
Chemically reducing  
Relatively superficial  
Metabolic depressor

## ULTRAVIOLET LIGHT, TESTING PATIENT'S TOLERANCE

It is not possible to lay down accurate inch-minute dosages, as lamps differ in effect, and patients in tolerance. It is necessary to determine the dosage in each individual case.

Make six holes in a sheet of letter paper, each about the size of a quarter, and lay on the patient's abdomen, protecting carefully all other skin surface. Adjust the light to the desired distance. 18 to 30 inches, depending upon the purpose of the treatment, and open the hood of the lamp. In one minute, cover the first hole; in three minutes the second, etc. The intervals can be varied to suit the individual case, but should be about 1, 3, 5, 7, 10, and 15 minutes. The next day, the spot that has achieved the desired reaction may be picked, and the dosage correspondingly determined.

## URETHRA, HYPERSENSITIVE (SEXUAL NEURASTHENIA)

Galvanism in the urethra: Use a catheter perforated at the end, or at the portion to correspond to the sensitive area; insert in it a cop-



per wire wound with cotton saturated with normal salt solution; this is the positive pole. The negative pad may be placed on the abdomen. Give 10 ma. for 10 minutes, not oftener than every four days.

## URETHRA, STRICTURE OF

**Galvanism:** Connect the positive pole with a pad on the abdomen, and the negative pole to an olive-shaped, metal, urethral bougie, one size larger than the lumen of the stricture. Turn on the current gradually to 3 to 5 ma. and keep in contact with the stricture by means of gentle pressure until it passes; then withdraw, and turn the current gradually down to zero before removing the electrode from the urethra. Repeat every 5 to 7 days, using a larger and larger electrode.

Do not use this technic in an acutely inflamed urethra.

**Ionization of thiosinamin.** (See *Scars*). Apply as per technic given under *Scars*, through an electrode made from a rubber catheter, perforated at the end, in which is placed a copper wire wound with cotton, saturated with the solution.

## URTICARIA

This is a disorder of the *Calcium Metabolism*, q. v.

**Ultraviolet Light:** Mild reactions, frequently repeated.

## URETHRITIS, CHRONIC

**High Frequency:** Urethral electrode; not over seven minutes.

The posterior urethra may be treated through the rectum, with the "insulated" rectal electrode.

**Ionization:** For the positive pole use an electrode made from a perforated catheter, inside of which is a copper wire or stylet wound with cotton saturated with 2 per cent copper sulphate solution; negative pad on the abdomen; 5 to 10 ma. for 10 minutes, three times a week.

**Ultraviolet Light:** Use special urethral applicator: Air-cooled lamp, 2 to 10 minutes; water-cooled lamp,  $\frac{1}{2}$  to 5 minutes. The rectal applicator may also be used.

The urethral applicator may be protected on the portions where it is not desired to produce a reaction in the urethra, by covering with paper or tape.

**Diathermy:** The active electrode is a sound in the urethra; and the indifferent electrode may be placed on the abdomen.

**Infrared:** Moderate or intensive, prolonged.

**Vibration:** 1. Stimulate sacral, lumbar, and lower four dorsal centers with the ball vibratode.

2. Treat the inguinal lymphatics, using the brush with lateral stroke; and then for 30 or 40 seconds over the penis itself.

3. Stimulate the liver and spleen (fifth to ninth dorsal) on the right side for liver and left side for spleen.

## UTERINE FIBROID

See *Fibroid of Uterus*.

## UTERINE MALPOSITION

**Galvanism:** Soften the tissues with the negative pole, using an intra-uterine electrode, with strictest asepsis. Then, replace in the proper position, and harden with the positive pole. For further details of intra-uterine technic see *Menorrhagia* and *Metrorrhagia*.

**Surging Sinusoidal:** For strengthening the muscles; use an intravaginal electrode, wrapped with gauze saturated with 1 per cent salt solution; give current intensity toleration, about 10 surges per minute; short treatment to begin with, and increasing in length and intensity.

**Vibration:** Stimulation of third, fourth and fifth lumbar centers causes vaso-constriction and muscular contraction; inhibition of these centers causes the reverse. In practice it is best to vibrate from the tenth dorsal down to the coccyx.

Local vibration over the abdomen, with percussion stroke and deep pressure; and through the vagina with vaginal or urethral applicator; short, rapid stroke,  $1\frac{1}{2}$  to 3 minutes.

## UTERUS, INFANTILE

**High Frequency:** Insulated vaginal electrode; current intensity to tolerance. Not over seven minutes.

**Galvanism:** Intra-uterine electrode on negative pole with strict asepsis. For further details of intra-uterine technic, see *Menorrhagia* and *Metrorrhagia*.

**Surging Sinusoidal:** Electrodes intra-uterine, and pad on the abdomen; about 10 surges per minute. Begin with low current intensity and short time, and increase in later treatments, as strength increases.

**Vibration:** Same technic as given under *Uterine Malposition*.



## VAGINISMUS

Vibration: See vibratory technic under *Uterine Malposition*.

Galvanism: Wrap a metal electrode with gauze or cotton saturated with 1 per cent sodium chloride solution, and insert into vagina through a speculum; withdraw the speculum, leaving the electrode and wrapping in place. Negative pole, 6 to 10 ma. for 15 minutes at the beginning, and 30 in later treatments. Positive pad on the abdomen.

## VAGINITIS

High Frequency: Use "non-insulated" vaginal electrode; current intensity to toleration; time, not over seven minutes.

Ionization: Use a douche-point with a shield that will occlude the vaginal orifice. Use isotonic zinc solution (for formula see *Ionization*), through a fountain syringe, with sufficient elevation to distend the vagina. Connect to positive pole with a wire stylet and metal connecting-tube, in the same manner as directed and sketched under *Prostatitis, Chronic*. The negative pad is on the abdomen. Current intensity to toleration, 15 to 30 ma. for 10 minutes, daily. First douche, to remove the discharge.

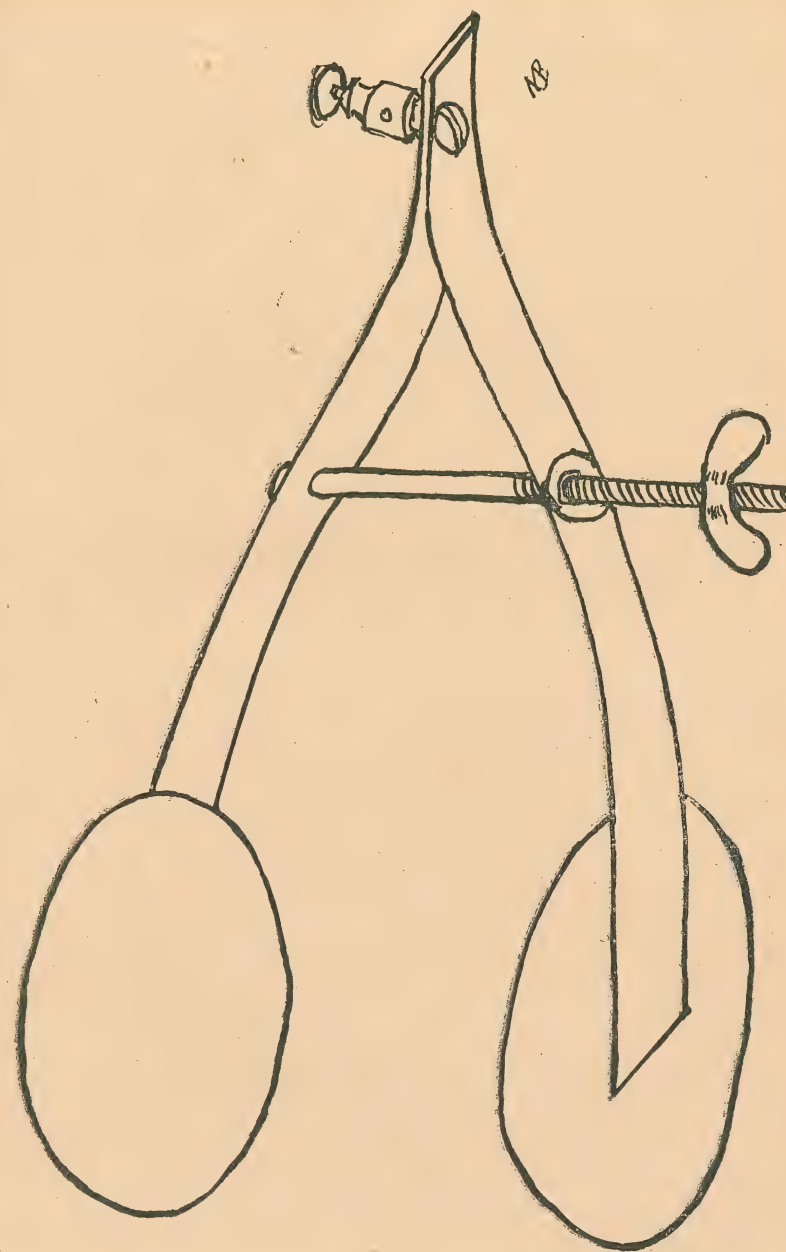
Ultraviolet Light: Vaginal applicator; air-cooled lamp, 2 to 10 minutes. Produce severe reactions.

## VARICOCELE

Galvanism: improvise an electrode from a strong clockspring, to hold two metal plates around the enlarged mass. See sketch. Place pads of cotton between the plates and skin, wet with 1 per cent salt solution, and connect with positive pole. The negative pole is a large pad on the abdomen or on the lumbar spine. Give 10 ma. for 10 minutes daily or as often as the irritation of the skin will permit. The pain will be relieved by the second to the sixth treatment; cure may be expected by the fifteenth to the twentieth treatment.

Surging Sinusoidal: Use the electrode as suggested under *Galvanism*; give current intensity to toleration, for 10 minutes; 20 surges per minute.

Vibration: Soft applicator, rapid, short stroke, light brushing motion, over the mass of veins and up into the groin in the direction of the lymphatics. Treat every day for six days, and then twice a week till cure or till improvement ceases.



Electrode for Varicocoele.



## VARICOSE ULCERS

See also *Varicose Veins*.

**High Frequency:** Long, thick, high potential sparks over the affected limb; on the spinal centers; and on the general muscle masses of the whole body.

**Ultraviolet Light:** Long exposures on the ulcer itself; three or four times the length that is required to produce reactions on the healthy skin. Then, tan the skin of the entire leg thoroughly; by means of frequent and mild reactions.

**Ionization:** A pad moistened with isotonic zinc solution (for formula see *Ionization*) as the positive pole, right on the ulcer, connected by means of a tin or lead or zinc strip. Local anesthesia may be necessary; (dust a little alypin, cocaine, or anesthesin into the ulcer). The negative pole is a large pad moistened with 1 per cent salt solution, on the opposite side of the leg. 10 to 20 ma. for 10 minutes.

## VARICOSE VEINS

**Surging Sinusoidal:** Cuff or gauze moistened in 1 per cent salt solution around the leg just below the knee; block tin sheet around the outside of the gauze; do not let the metal come in contact with the skin. Similar cuff around the foot, including instep and dorsum. Use sufficient current intensity to produce contraction of the muscles, but not enough to fatigue them; and about 20 surges per minute.

**Vibration:** Soft applicator, rapid, short stroke, light brushing motion in the direction of the blood in the veins, and considerable distance beyond the enlarged vein. Treat every day for six days, and every second day for two weeks; then twice a week until improvement ceases.

2. General spinal stimulation.
3. Stimulation of neighboring lymphatics.

**High Frequency:** Sharp sparks, as long as the patient will tolerate; must be at least sufficient to produce a jerk of the muscles. All over the leg, and up to the middle of the thigh, for about 10 minutes. Every day for six days, every second day for two weeks, and then twice a week till improvement ceases.

**Ultraviolet Light:** Secure severe reactions, and repeat when the preceding reaction has begun to subside.

## VESICULITIS, SEMINAL:

**Surging Sinusoidal:** In this case, the electrical treatment has this advantage over manual massage, that the electrode can be inserted higher up into the rectum, and farther to the side, and brought into much better position than is possible with the finger. Use same technic under *Prostatitis, Chronic*.

**Ultraviolet Light:** Rectal applicator; air-cooled, 5 to 10 minutes; water-cooled, 1 to 3 minutes; daily to twice a week.

## VIBRATION

### Physiology:

1. Increases the circulation of the blood, thereby increasing  
Nutrition and growth  
Healing and repair  
Specific function, as of glands, nerves, etc.  
Elimination.
2. Promotes the circulation of lymph, thereby especially increasing elimination.
3. Stimulates nerve endings, with the following effects:  
Stimulation in mild doses, producing  
Increase of function  
Counter-irritation  
Reflex effects (these can be traced on the chart given under *Spinal Stimulation, Rationale of*).  
Inhibition in heavy doses, producing  
Anesthesia and analgesia.  
Decrease of function.  
Counter-depression.

In order that this may be thoroughly understood, read a good discussion of *counter-irritation* and of *reflex-pain* in a textbook on physiology, neurology, or therapeutics.

### General Technic

Stimulation is accomplished by

- High speed
- Short stroke
- Light pressure
- Short time, 3 to 7 seconds

Inhibition is in reality over-stimulation or paralysis.

- Low speed
- Long stroke
- Heavy pressure
- Long duration, 15 seconds to 3 minutes. Muscles require longer than nerves.

### Contra-indications:

1. Enclosed, undrained pus



2. Pregnancy
3. Arteriosclerosis
4. Malignancy
5. After meals

## VOMITING

Use technic as given under *Nausea*.

## WARTS AND MOLES

Fulguration is the best method. Do not treat too deeply at one time, and wait until the wound has healed before repeating. If too much destruction is effected at one time, keloids may result.

Electrolysis: Introduce a needle connected with the negative pole, parallel to the skin, and penetrating through the entire growth. The positive pad must be large, and may be on any other portion of the body. Allow 2 to 4 ma. of current to run through it long enough to blanch the growth. Allow a crust to form and fall, before repeating.

## WHOOPING COUGH

See *Pertussis*.

## X-RAYS

Detailed technic is not given. Considerable danger is attendant upon the manipulation of x-rays. Their use in treatment is a subject for study in itself. To the man doing general work, any technic that could be given in a work of this scope, would be insufficient, and not entirely safe. The man who is trained in the handling of x-rays needs no assistance from this work.

## X-RAY BURNS, ACUTE

Ultraviolet Light: The treatment requires from four to twenty-four weeks. The pain eases up after one, or a very few treatments. Do not stop as soon as healing takes place; the burn may recur.

Get a very intense reaction with the first treatment or two; 30 minutes with the lamp at 24 inches; be sure to expose under the flaps and stumps, and for several inches around the lesion.

When granulations appear, reduce the dose, so as not to destroy them. If granulations appear on only a part of the area, cover them up a part of the time while giving a heavy exposure to the rest.

On the erythematous skin around the ulcer, it is necessary to produce repeated moderate reactions.

To remove the deeper damage, diathermy, "ionizing" doses of x-ray (Sampson), massage, and manipulation are necessary.

## X-RAY BURNS, CHRONIC

### Ultraviolet Light:

Begin with diathermy.

Then use massage and manipulation, beginning gently and gradually increasing.

Then introduce high frequency or static sparks.

When the atrophic skin has begun to react somewhat, use the ultraviolet light; precede by 30 minutes of the radiant. Use heavy reactions with short wave-lengths.

See *Ultraviolet Light, General Technic*.

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